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THE ALKALOIDS OF VERATRUM VIRIDE AND ALBUM—HISTORY, PREPARATION AND RECOVERY FROM COMPLEX MIXTURES AND THE BLOOD.

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Chemical History.—Much discrepancy has existed among observers in regard to the exact nature of the active principle or principles of *Veratrum Viride.*

Thus, in 1838, Mr. H. Worthington announced that he had obtained from the plant "an alkaloid substance identical with veratria."

And, in 1857, Mr. J. G. Richardson, after an elaborate examination of the subject, concluded that "not only in its physical characters, but also in its chemical actions, the alkaloid of veratrum viride *is* identical with veratria of the Veratrum sabadilla." (*Amer. Journ. Phar.*, 1857, p. 209.)

In 1862, Mr. G. J. Scattergood announced that in addition to veratrin, the plant contained another substance, similar in nature to that alkaloid, but insoluble in ether, and also a third substance, a resin to which the sedative action of the drug was chiefly due. (*Ibid.*, 1863, p. 74.)

So also, in 1864, Prof. S. R. Percy extracted from the plant an alkaloid, which he concluded had all the chemical properties of veratrin, from Veratrum sabadilla. (Prize Essay.)

On the other hand, in 1865, Mr. Chas. Bullock claimed (*Amer. Journ. Phar.*, 1865, p. 321,) that the alkaloid in question was not identical with veratria, as it did not respond to the sulphuric and hydrochloric acid tests for that alkaloid; that the resin of Scattergood owed its activity to the presence of another alkaloid; and that these two principles exhibited the same reactions with the mineral acids and with liquid reagents, the chief difference being in their fusing points and in that one was soluble while the other was insoluble in ether. Prof. Geo. B. Wood named these substances respectively *veratroidia* and *viridia.*

In 1872, Dr. Peugnet (*Med. Rec.*, May, 1872, p. 121) also concluded that the veratroida of Bullock was distinct from veratria, as it did not respond to the sulphuric acid test for that base, although it did to Trapp's test (hydrochloric acid). And he was the first to announce that Bullock's viridia was identical with Simon's jervia of Veratrum album.

So, in 1874, Mr. C. L. Mitchell (Proc. Am. Phar. Asso., 1874, p. 436,) obtained from this plant a base readily soluble in ether, which failed to fully respond both to the sulphuric and hydrochloric acid tests for veratria, and he therefore concluded that it was a distinct principle. Mr. Mitchell confirmed Dr. Peugnet's announcement of the identity of viridia and jervia.

Much the same confusion has existed in regard to the principal alkaloid of *Veratrum album.* Thus, in 1819, Pelletier and Caventou announced that the alkaloid of the plant was identical with veratria from sabadilla seeds; whilst, in 1872, Dr. Peugnet claimed that the alkaloid was not veratria, but identical with veratroidia of Veratrum viride; whilst still later, Mr. C. L. Mitchell claimed that it differed from both alkaloids, and proposed for it the name *veratralbia.*

The question as to the identity, or otherwise, of these principles being a matter of considerable importance, especially in toxicological examinations, we have given the subject very careful study, and, as the result of repeated experiments, we find that *both veratrum viride and veratrum album contain an alkaloid, which, when pure, in its behavior with the mineral acids and with liquid precipitants, fully responds to all the reactions of veratria or veratrin.*

Thus in the solid state, under the action of concentrated sulphuric acid, the alkaloid from both plants assumes a yellow color, and slowly dissolves to a yellow or reddish-yellow solution, which after a time becomes orange red and finally deep crimson with a purplish hue. If the mixture be gently warmed, the crimson coloration manifests itself at once.

If the alkaloid is impure, at least, if it contains an apparently oily matter which adheres most tenaciously, it will strike a more or less red color with sulphuric acid and quickly dissolve to a reddish-yellow solution, which after a time acquires a more or less brownish-red color, but fails to assume the crimson coloration of the pure alkaloid. The presence of pure jervia in very minute quantity does not appear to materially interfere with the normal reaction of the alkaloid with this acid.

The claims, as we have already seen, that the alkaloid in question from the three different veratrums was not the same, has been based chiefly upon the behavior of the product obtained with concentrated sulphuric acid; and also in part upon its behavior with hydrochloric acid.

It may here be stated, that several years since we received of Dr. Percy, of New York, a small sample of the alkaloid prepared by Mr. Scattergood, of Philadelphia, from *veratrum viride*, which yields color reactions with sulphuric and hydrochloric acids, identical with those of pure veratria, when compared side by side with that alkaloid.

It has also been claimed that "veratralbia" differed from "veratria and veratroidia," in that its solution failed to yield a precipitate with chloride of platinum. But we find that solutions of each of the so-called different principles, when of the same strength and under like conditions, if not too dilute, will yield precipitates that in no way can be distinguished.

Preparation of the Alkaloids:—For the preparation of the alkaloids of *veratrum viride*, a fluid extract of the root, prepared by Sharp & Dohme, of Baltimore, was employed throughout our examinations. After a number of experiments the following method was adopted:

The fluid extract, acidulated with acetic acid in the proportion of fifteen minims per fluidounce, is added with constant stirring, to eight volumes of pure water,—the mixture allowed to stand 24 hours, or at least until the precipitate has completely subsided, and the liquid then filtered. The clear, yellowish filtrate is concentrated on a water-bath to something less than, or even to one half, the volume of the fluid extract employed, when it is allowed to cool and again filtered.

The filtrate thus obtained is treated with slight excess of carbonate of sodium, which will throw down a voluminous precipitate of the mixed alkaloids. This mixture is agitated with about its own volume of *ether*, which will readily take up the precipitate. After decantation of the ether, the alkaline fluid is washed with a small quantity of fresh ether, which in its turn is decanted.

Although *jervia* in its pure state, when precipitated, is only very sparingly soluble in ether, yet under the above conditions, it is very freely soluble in this liquid, 100 fluidgrains of the liquid readily taking up between two and three grains of the mixed alkaloids. In its crystalline state, the alkaloid appears to be wholly insoluble in this menstruum.

The ether employed in most of the present examinations was of sp. gr. 0.725.

The ether employed for the above extractions, is allowed to evaporate, small portions at a time, in a rather deep, thin glass capsule, and the resulting residue dried in a water-oven.

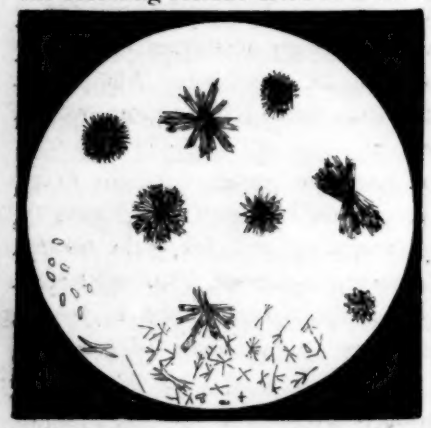

FIG. 1. JERVIA, FROM ETHERIAL SOLUTION. 30 DIAM.

The outer or upper portion of the residue thus obtained, will consist chiefly of the *veratria*, in the form of a transparent, more or less yellowish, vitreous mass, in which, under the microscope, may be found some scattered crystals of jervia: in drying, this portion of the deposit generally separates, in part at least, from the sides of the capsule, in the form of transparent scales. The central or inner portion of the deposit will consist chiefly of the *jervia*, in the form of bold groupes of crystals. Fig. 1. About two grains or something more of residue will be obtained for each fluid ounce of the fluid extracts employed.

For the separation of the alkaloids, the dried residue is treated with a little water strongly acidulated with hydrochloric acid (1:10), which will readily dissolve the veratria, whilst the jervia will be converted into the insoluble chloride. The quantity of acidulated water thus employed may be in the proportion of about a fluid drachm for every two grains of residue.

This mixture is transferred to a small, moistened filter, and, if necessary, the filtrate returned to the capsule until the whole of the insoluble matter is transferred to the filter, which is finally washed with a little acidulated water, and reserved for the recovery of the jervia.

The alkaloid in the *filtrate* may be further purified by washing the acid solution with ether, precipitating by sodium carbonate, and then either taking up the precipitate by ether or collecting it on a filter and washing, these operations being repeated, if necessary. On precipitating with sodium carbonate, a notable quantity of the alkaloid remains in solution, and may be recovered in a quite pure state, by extracting the

filtrate with ether. In its pure state, as left by ether and pulverized, the alkaloid forms a pure white, sparkling powder.

For the recovery of the *jervia*, left on the filter in the form of chloride, the deposit, being first pulverized, is boiled for some time, with a solution of carbonate of sodium, the mixture transferred to a filter, and the residue washed with a little water. The washed residue is treated on the filter with a little water strongly acidulated with acetic acid, by which the liberated alkaloid will be dissolved. The filtrate thus obtained will usually be more or less turbid; but by returning it to the filter, it may be obtained clear.

The jervia is now thrown down form the filtrate by slight excess of carbonate of sodium, and the precipitate extracted by agitating the mixture with *chloroform*, which on evaporation will leave the alkaloid in the form of a hard, transparent, amorphous deposit. On moistening this residue with a few drops of water, containing a drop or two of alcohol, it will quickly be converted into a white mass of groups of crystals of the pure alkaloid.

A portion of both alkaloids is retained by the resinous matter separated from the original aqueous mixture of the fluid extract, and may be recovered by boiling the powdered mass with water strongly acidulated with acetic acid.

The alkaloids from *veratrum album* were obtained by extracting the *powdered root* with water containing acetic acid, treating the concentrated solution with carbonate of sodium, and taking up the precipitate by ether, in the manner already described. The ether extract of the mixed alkaloids left the jervia in the same crystalline form as obtained from veratrum viride.

Reactions of Jervia:—Sulphuric acid causes pure jervia to assume a yellow color, and slowly dissolves it to a yellow or faintly reddish-yellow solution, which after some minutes acquires a beautiful bright green color. A very minute quantity of the alkaloid will exhibit this coloration. After a few hours, the green color thus produced disappears, and a dirty white or brownish precipitate separates.

This acid produces similar results with the chloride, sulphate, and acetate of the alkaloid, when in the solid state; but it dissolves the nitrate with the production of an orange-red color, which is permanent for at least some hours.

Nitric acid quickly dissolves the alkaloid to a colorless solution, which after a time acquires a more or less rose or pinkish hue.

Hydrochloric acid fails to produce any marked coloration or to dissolve the pure alkaloid, immediately converting it into the chloride, which is insoluble in the presence of the free acid, although somewhat soluble in pure water.

The foregoing mineral acids occasion the following reactions with one grain of a 1-100th *solution* of the alkaloid, in the form of acetate:

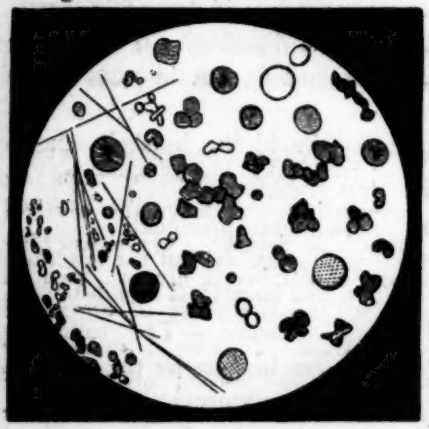

FIG. 1. 1-100 CRAIN JERVIA + SULPHURIC ACID. 75 DIAM.

1. *Sulphuric acid*, dilute (1:5), produces an immediate turbidity, and in a few moments a dense dull-white amorphous precipitate, which soon becomes more or less granular. After a time, the deposit consists of more or less circular, nodular masses, and especially along the margin of the deposit, fine groups of long, very delicate crystalline needles. Fig. 2. These circular masses generally appear, under the microscope, of a brownish color. The reaction of this acid is quite peculiar to this alkaloid.

2. *Nitric acid* of sp. gr. 1.20, occasions an immediate, copious precipitate, which in a little time becomes converted into nodular masses, some of which are spinated.

If the jervia solution contains excess of free acetic acid, especially if a minute drop of this acid be added after the reagents, the precipitate soon becomes converted into a mass of crystals of the forms illustrated in Fig. 3.

FIG. 3. 1-100 GRAIN JERVIA + NITRIC ACID. 75 DIAM.

*Nitrate of Potassium** produces with a neutral (1-100th) solution

* This reagent has been proposed as a valuable test for the alkaloid by Mr. Chas. Bullock, in a paper in the October number of this Journal, which came to hand about the time we had completed our examinations.

of the alkaloid, an immediate turbidity, and after a little time, a quite good deposit of granules and crystalline masses. In the presence of free acetic acid, this reagent produces much the same results as free nitric acid.

3. *Hydrochloric acid* produces an immediate, copious, dull-white amorphous precipitate, which becomes more or less granular.

4. *Bromine in bromohydric acid* throws down from solutions of the alkaloid, a dense, curdy, yellow precipitate, which is readily soluble in alcohol. On spontaneous evaporation of the alcoholic liquid, the deposit is left in the granular form.

5. *Platinic chloride* produces a deep yellow precipitate, which becomes lighter in color, and more or less granular.

6. *Auric chloride* occasions a light yellow, curdy precipitate.

Jervia is also precipitated by other liquid reagents, but the reaction, like the last three mentioned, are common to a large class of substances.

Recovery of the Alkaloids from complex mixtures.—The following experiments were made in order to determine in how far the alkaloids could be individually recovered from complex mixtures:

Exp. 1. *Cat.*—Two drachms of the fluid extract of *veratrum viride* were administered to a half-grown cat. The animal was immediately rendered prostrate, and was dead in about *one minute* after the administration. As a quantity of the fluid extract escaped from the mouth of the animal, we have doubts if more than one drachm reached the stomach.

The Stomach.—The contents of the stomach, with the cut-up tissue of the organ, were strongly acidulated with acetic acid, the whole made into a liquid mass with water containing its own volume of alcohol, and the mixture digested at a moderate heat for half an hour. The liquid was then strained, concentrated, again strained, and finally reduced to a small volume and filtered.

This filtrate was treated with slight excess of carbonate of sodium, and the mixture extracted with ether. The deposit left on evaporating the ether, contained a large number of groups of crystals of jervia, and the margin was of a resinous character, and also contained small crystals.

The residue was treated with a little water containing hydrochloric acid, and the alkaloids separated in the manner already described, the chloride of jervia being collected in a small filter.

The second ether extract of the *veratria* furnished the alkaloid in a sufficiently pure state to yield very satisfactory results with the sulphuric acid test.

The final residue of the *jervia*, consisted of a mass of crystals of the alkaloid.

The Blood.—Seven drachms of blood were recovered from this animal. This fluid was treated with six drops acetic acid, its own volume of alcohol and a somewhat larger quantity of water, and the whole violently agitated for some minutes in a bottle.

The mixture, transferred to a dish, was digested at a moderate heat, then strained, and the solids washed. The strained liquid was concentrated, again strained, and these operations repeated until the liquid was reduced to about half a fluidounce, when it was filtered.

The filtrate, after addition of carbonate sodium, was extracted with about an equal volume of ether, and this liquid evaporated, small portions at a time, in a small capsule. A careful examination of the residue left by the ether, failed to discover any crystals. But on treating the residue with a few drops of diluted alcohol, and gently evaporating the liquid, a number of small crystals and crystalline groups, of the forms shown in the lower portion of Fig. 1, were found in the resinous or outer portion of the deposit.

The central portion of the deposit was now dissolved by treating it with a very small quantity of water acidulated with acetic acid,—care being taken not to disturb the resinous portion of the deposit. For detaching and effecting solution of the deposit in this operation, a small feather, or, better still, a small flattened pencil of rubber in a glass handle, will be found useful. The quantity of the alkaloids present under these conditions, is too minute to permit of separation in the manner previously described. But as the jervia is rather readily taken up by the acidulated water, whilst the veratria, as deposited, is but slowly acted upon by the liquid—they may in very great part be thus separated.

The liquid, which now contained the greater part of any jervia present, was decanted, treated with a little carbonate sodium, and the mixture extracted with ether, which on evaporation left an amorphous residue. On moistening this with a few drops of diluted alcohol, and evaporating the liquid, the residue, distributed over a space nearly an inch in diameter, was found to consist of a mass of small crystals of *jervia*, of the forms and as thickly distributed as shown in Fig. 4.

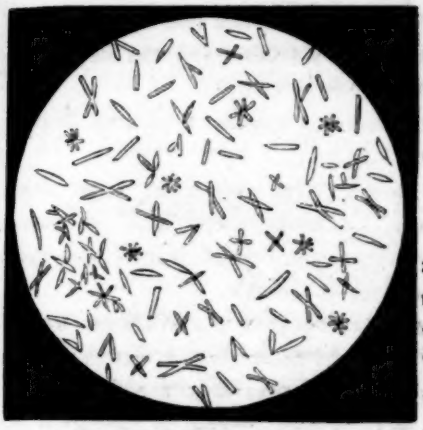

FIG. 4. JERVIA, FROM BLOOD OF CAT. 75 DIAM.

On further purifying the resinous matter left in the capsule, it furnished, under the action of concentrated sulphuric acid, very good evidence of the presence of *veratria*.

Exp. 2. *Dog.*— Between two and three drachms of the fluid extract were administered to a dog, weighing about thirty-five pounds. The animal was soon seized with violent vomiting and retching, succeeded by purging and discharge of urine. Two hours after the administration, there still being very active symptoms, the animal was killed by a blow upon the head. The *stomach* of this animal was not examined.

The Blood.—Three ounces of blood carefully taken from the femoral artery of this animal, were acidulated with acetic acid, violently agitated with a mixture of water and alcohol, and the mixture treated in the same manner as the blood from the cat,—the final solution being reduced to 375 fluidgrains.

This solution, after addition of carbonate sodium, was extracted with 200 fluidgrains of ether, and finally washed with a little of that liquid.

Ten fluidgrains of the ether first employed, when allowed to evaporate, left a residue containing a large number of minute crystals of jervia. On evaporation of the whole of the ether employed, another crop of crystals was obtained, and the margin of the residue was of a resinous character.

On separating the different portions of the residue by acidulated water and treatment in the manner already described, perfectly satisfactory evidence of the presence of *both alkaloids* was obtained.

The quantity of veratria recovered in this instance seemed to be greater than in the case of the cat, whilst that of the jervia seemed to be less.

Of all the alkaloids, there is none, according to our experience, so readily recovered in its crystalline state from the blood, when carried

there by absorption, as jervia. We have elsewhere (Micro-chemistry of poisons) cited some cases in which we recovered veratria from the blood of animals killed with the commercial alkaloid.

Columbus, O., Oct. 20th, 1875.

THE RELATIONS OF PHARMACISTS TO PHYSICANS AND NOSTRUMS.

BY FREDERICK HOFFMANN, PH. D.

It is with much reluctance that I have accepted an invitation to prepare a brief rejoinder to recent articles in some medical journals on the mutual relation of physicians and pharmacists, and on the nostrum traffic, which more or less bear the traditional stamp of disregard or misconception of the real relations existing between these two complementary professions at this time, when the rapid strides in the advance, as well as in the application, of their constituent sciences are more and more shaping their true scope and sphere in the health service.

On the surface of these articles there are three main points of dispute, namely: the sale of nostrums, the alleged prescribing by pharmacists, and "the propriety for physicians of *sending* prescriptions."

1. The *nostrum traffic* has attained such dimensions that, according to reliable statistics,* two-thirds of the total quantity of medicines annually consumed in the United States, are dispensed in the form of nostrums. When we inquire for the causes of this remarkable fact, in a country which can boast of one regular practitioner of medicine to every 600 inhabitants, looking aside from those thinly-settled regions whose population is scattered widely apart, where medical aid cannot be had readily and at all seasons of the year, and where for want of recognized family medicines or generally approved formulas for household remedies, the people as yet have recourse largely to nostrums; there are three alternatives obvious: first, that a large number of the nostrums really possess so much merit and have secured so much credit, as to offer, in all ordinary cases, a satisfactory substitute for average medical skill, as it can be obtained at present; or, secondly, that this latter is largely regarded as so far inferior or disproportionate in price to the actual or fancied benefit derived from nostrums, that experience and fact have secured for the "infallible" cure-all a greater

* "Boston Medical and Surgical Journal," August, 1874; and "Amer. Journ. Pharm," September, 1874, p. 445.

confidence than is felt in the fallible doctor; or, thirdly, that the public, who annually spend so many millions of dollars more for nostrums than for doctors, must greatly lack in common sense and judgment.

The pharmacist, as far as the nostrum traffic is concerned, is but a merchant; he occupies a neutral ground, and cannot, if he would, regulate it. His personal inclination or preference has just as little to do with the merits or demerits of nostrums as it has with those of the doctor; nor have pharmacists, in general, any influence upon the choice of the public between either of them, although their preferences as well as material interests are certainly in favor of the latter; and, moreover, they suffer by the alleged degeneration of their profession into a mere trade, much more than the physicians do, or than is generally known. It is not in their power, however, to change the law of demand and supply, nor can this be accomplished by statutes, forbidding or endeavoring to control the sale and use of nostrums, or the choice of remedies, doctors, or methods of treatment, by the people, any more than it is possible to protect the community in that way from the evidently large numbers of insufficiently educated, incompetent "and unskilled, yet regularly-graduated, physicians,"* nor restrain these from experimenting on the health and life of the afflicted, who, in many cases, have no chance to obtain an approximately correct estimate of the qualification of the physician or to discriminate between the educated one and the pretender, and, still less, have any means of detecting incompetency and malpractice until, perhaps, it is too late, and a valuable life has been sacrificed.†

So long as medicines in the form of nostrums and specialties are bought and used, it is, no doubt, safer that they should at least pass through the hands of a trade which is competent to exercise a kind of control over the character of that particular class of ready-made medicines. As long as pharmacy can uphold its present scope, its legitimate business should continue to embrace the dispensation to the public of all those products of nature, manufacture or art, which serve as remedies or are used for sanitary or domestic application, no matter what so-called school of medicine employs them, or in what shape or preparation they

* Dr. H. C. Wood, Jr., "Medical Education in the United States," in "Lippincott's Magazine," December, 1875, p. 703; and "Philadelphia Medical Times," January 23d, 1875.

†"New York Daily Times," July 17th, 1875.

are called for and retailed. If pharmacists should drop the nostrum traffic, as unwisely insisted upon by some medical journals, or should deliberately deliver to other branches of trade the sale of natural or artificial mineral waters, the keeping of homœopathic pellets or other articles which by long usage, have been associated with the drug trade as it has developed, outside of pharmacy proper, and, perhaps, against the preference and interests of the pharmacist, the result would certainly not be a decrease in the demand and use of nostrums, mineral waters, sugar pellets, fancy medicines, including elixirs, tonics, medicated candies, etc.;—their sale would only pass into less qualified hands. The nostrums and kindred specialties would pass from the show-windows and shelves of the drug stores to those of the grocer, fancy-dealer, confectionery store, etc., and would there, but with greater *éclat*, bear evidence of the fact how much more confidence a large part of the American people place in their familiar cure-all nostrums than in the skill of the average physician.

Unbecoming and discreditable, as is the association of the nostrum trade with pharmacy, yet, generally speaking, the choice of the smaller evil from the two alternatives forced upon the pharmacist, justifies him, in the interest of the public, in retaining, and, as far as possible, controling the trade in medicines, in whatever legitimate form they may appear in the market. The correctness of this view is sustained by the fact, that it is practically applied in countries whose sanitary regulations are very strict and are regarded as models of wise and adequate legislation. With the increase of travel, the American quack medicines have followed the large annual exodus of our substantial classes to Europe, and many of our popular nostrums, in consequence of the great demand, have been introduced on the continent of Europe and in Germany, where medicines are not admitted to patent-rights; but no sooner had the demand called forth their importation, than the Imperial government promptly enacted a statute, confining the exclusive trade in this kind of "Yankee notions" to the apothecaries, in order to submit them, as far as practicable, to the control of a competent and critical profession.

For the present, therefore, it may be safest for pharmacy to embrace in its scope every legitimate system and mode of dispensing and retailing medicines, while the attainments and character of the pharmacist should ever remain a criterion and a safeguard both to the public and the physician, and should prevent him from countenancing imposture

or fraud. On the other hand, as already stated, it should fairly be taken into consideration that the nostrum-traffic has been forced upon him, and that he, as a rule, takes an adverse position, only supplying the demand; as also, that the pharmacist has no right to influence the choice of the customer between the physician—allopath or homœopath —or the familiar nostrum, unless called upon for his opinion.

Moreover, every well-informed person knows that the nostrum traffic cannot effectually be restrained merely by the favor or disfavor of pharmacists any more than by that of physicians, and that the use of nostrums is by no means confined to the non-educated portion of the community, but that it prevails largely among the wealthy classes, both at home and abroad; as also, that among the patrons of this class of medicine, as the prescription file of the drug stores throughout the country will testify, may be numbered not a few physicians of good standing.

But when we come to the bottom of the question, and inquire without bias for the primary cause of the origin and great success of the nostrums in our country, we cannot but lay a very great part of it at the door of the medical profession at large, or, perhaps, attribute it, ultimately, to the want of adequate laws for the regulation of the methods and standard of medical education and the requisite qualification for admission to the practice of medicine by physicians. The fact is that nostrums, to a very large extent, have supplied an actual want, in consequence of lack of trustworthy medical aid and of confidence, on the part of the community, in the qualification of a large number of physicians. This want has opened many a door to nostrums in preference to the doctor, and has contributed much to raise this traffic to its present extent, almost exactly in proportion with the increase in numbers and the decrease in qualification and public trust in the average doctors, a large portion of whom "have attained and still acquire their training and engage in practice under the absurd notion that a medical education can be acquired in two winters, and in many cases, even without a preliminary grammar school education."* It is therefore no wonder that in the choice between the cure-all nostrums, or the pellet and drops of the homœopath, or a multitude of unqualified practitioners, not to speak of the pretenders and impostors, the public frequently give preference or a first trial to the harmless sugar pellet or the familiar nostrum, and that two-thirds of the entire amount of drugs and medicines annually consumed in our country, are bought and used in the form of nostrums.

*Dr. H. C. Wood, Jr., "Lippincott's Magazine," December, 1875, p. 705.

Nor is it strange that among the large class of educated, conscientious and high-minded physicians, who have more or less to suffer * by the iniquities of unworthy competitors, and who keenly feel the disgrace which these reflect upon the profession at large as well as among the public, the demand for adequate legislation † is increasing, in order "to check the unbridled license of the lower class of practitioners, and to protect the community against the disastrous activity of a multitude of untrained and reckless, yet regularly graduated, practitioners."‡

That the public apply to the pharmacist for their supply of medicines of their own selection, is but an evidence of the superior trust which he possesses in the general regard of the people, who are well aware of the fact that American pharmacy, by its own exertion and energy, has, of late, raised its status much nearer to the European standard. Nor is that all; it is still advancing quietly and without any presumption, indeed, but with such success that empiricism and incompetency, so largely prevailing, and, as generally admitted, on the increase, among physicians, are more and more falling into oblivion among pharmacists.

Under these circumstances, medical writers should exercise due regard and discretion in criticising pharmacists in their legitimate attempt to check and relieve an evil, whose magnitude is largely the consequence of the shortcomings of a great part of the physicians of the land. The present move on the part of pharmacists to counteract the use of nostrums, by instructing the people, by means of an annual almanac,§ in regard to their composition and danger is, perhaps, the wisest method. It has been successful in other countries, and is, at least, worth a trial here; while in regard to the before-mentioned causes of the success which the nostrums have attained in our country, as substitutes for medical aid, it is certainly the most discreet and forbearing means within the reach of the pharmacists. They, of course, are well aware of the incompleteness of their effort, as they cannot expect a sweeping change so long as the shortcomings and disqualification of so large a portion of practitioners continue to

* Dr. Wm. T. Edgar, President's Address before the Medical Editors' Association. "St. Louis Medical and Surgical Journal," May, 1875, p. 231.

† Dr. Stephen Smith. "Public Health Service and Medical Education;" an address before the American Public Health Association. "New York Daily Times," November 13th, 1874.

‡ Dr. H. C. Wood, Jr., "Lippincott's Magazine," December, 1875, p. 711.

§ The Popular Health Almanac, edited by Fred. Hoffmann.

diminish confidence in the unexceptional qualification of the medical profession at large, and tend to drive the public to other means of relief, and among them, especially, to nostrums.

2. The charge upon pharmacists of the alleged practice of prescribing, or advising and dispensing medicines on their own account and responsibility, when called upon to do so, is one which medical men occasionally like to indulge in, and in which they draw largely on their own imagination, and put all the real or fancied facts deliberately to one side. The fact is, that the choice of the methods or agents to be employed in the maintenance or restoration of health, and the inquiry for, as well as the imparting of advice as to remedies and their application or use, as well as the sale of unobjectionable commercial drugs and medicines, with the exception of a few whose sale is restricted for their poisonous character, by State or local laws, and the compounding of physicians' prescriptions, is entirely optional to every individual in this land, as well as, more or less so, elsewhere. This principle, right or wrong, has lately asserted its validity in regard to the practice of medicine, even in Germany,* notwithstanding its rigid statutes and thoroughly educated body of physicians; it, unfortunately, leaves a wide and precarious range to license, which, however, under the present constitutional privileges of every individual, evidently cannot effectually be met otherwise than by the jurisdiction of the penal code in the courts, as the ultimate safeguard and recourse in cases of injury by malpractice. Beyond this alternative and the fundamental exigency in this country, to raise and establish by statutes, and subsequently to maintain, the standard of education and qualification in the professions, no other tribunal can be had for the present, unless that moral one which culminates in a proper and sound sense of responsibility, character and honor in the individual, and which pharmacists, not less than the physicians, individually as well as a class, should possess and deserve *par excellence.*

Far from sanctioning or countenancing imposition or licence by unqualified or unprincipled persons, inside or outside the professions, although they, to a very large extent, are admitted by the laws and customs of the land, it may, in regard to pharmacists, be but proper to take into consideration, on the other hand, how much good they do, in the way of preventing misapplication or omission, and how many a

* "American Journal of Pharmacy," July, 1874, p. 321.

valuable life they may save, by their intelligent and conscientious action, and by wise counsel in impressing upon the minds of their customers or the afflicted the advantage or necessity of abstaining from experiments, at least with domestic remedies, sugar pellets or nostrums, and of resorting in time to medical aid.

The truth is that, in this respect, no complaint on the part of the community against the pharmacists appears to be on record; and it may safely be said that American pharmacy, notwithstanding its many wants, especially in regard to the general culture in the individual, which it has in common with the other professions, evidently enjoys, at present, to a large extent, the public confidence, and meets all reasonable expectations to general satisfaction. Whenever there has been any just demand, the profession has shown the spirit and energy to redress and improve any shortcoming, while in its schools it has continually been raising the standard of education and qualification, although they, perhaps, may have, in time, to face the same danger which so deplorably has lowered the status of qualification in so large a portion of American physicians, arising from the excessive and reckless multiplication of rival schools, many of which are said to confer the degree of M. D. indiscriminately "on the veriest boor, almost without expense, and upon an examination which is little or nothing more than a farce," and in this way "annually to let loose upon the community a multitude of doctors who are totally unfit for the momentous duties with which they, by such a diploma, are legally entrusted."*

Under such circumstances, where the fundamental requisites for confidence and reliance in the physician are so much and so widely wanting, in a great number even of regular practitioners throughout the land, and where evils are so openly known to exist and call for reform, evils which are of no small magnitude to the profession, but of infinitely greater consequence to the community, the advancing of imputations, like the above-mentioned one, on the part of medical journals, is at least untimely and impolitic, as it is also uncalled for, and recalls forcibly the application of the old adage: "Those who live in glass houses should not throw stones."

3. "*We might suggest the propriety of sending our prescriptions to such pharmacists as do not vend patent medicines.*" Although none more than

*Dr. H. C. Wood, Jr., in "Lippincott's Magazine," December, 1875, pp. 707 708 and 709.

pharmacists would hail the day when, in consequence of the restored universal trust in the physician, doctors' prescriptions and the exclusive demand for legitimate medicines would take the place of every sale of a nostrum, and the latter pass into oblivion, yet they cannot admit the logic as construed and applied in the above assertion, cited from an editorial in the New York "Medical Record:"* they share with the majority of well-informed and accomplished physicians and the intelligent part of the community in the opinion that the time has passed by, when reliable and competent pharmacists were at a premium, and that at present the large body of educated pharmacists to be found throughout the country, no matter if they sell nostrums or not, are both qualified and trustworthy in their business, however it may be designated by some doctors "as a profession or a trade."† If physicians cannot make this discrimination, the public can, and will more and more act on their own judgment in the choice of a pharmacist, just as in that of a doctor. People of culture cannot but feel it an impropriety in a physician, unless in exceptional cases, to direct or dictate to a patient where to go in order to get his prescription compounded, and such insinuation would reveal a want either of tact or of good sense in the physician, and would possibly suggest the traditional suspicion of a special interest of the latter in the profits which he confers upon a pharmacist.‡

In leaving this unpleasant subject, which it is unwarrantable for medical writers to advance as a menace,§ and in relation to an attempt on the part of pharmacists as to the best and most efficient methods in dealing with the nostrum traffic, it is proper to state, as expressing the sentiment of the pharmaceutical profession and to a large extent that of the intelligent public too, that pharmacists are fully justified in sharply repelling any such unbecoming insinuation, from whatever side it may come, whether by caprice or by want of respect, or under the obsolete notion that physicians have the prerogative of exercising a tutelage over the practice of pharmacy, a profession which, in the United States, too, has reached its majority, and become competent to take care of its own affairs and to stand on its own merits.

When we balance the present status of medicine and pharmacy in

* October, 1875, p. 729.

† New York "Medical Record," October, 1875, p. 682.

‡ "American Journal of Pharmacy," September, 1874, p. 444.

§ New York "Medical Record," October, 1875, p. 729.

our land, the latter need not shrink before a critical but equitable and just comparison, both in its accomplishments and its share of application and usefulness in the health service. Both professions present a wide and constantly increasing sphere for scientific acquirement and practical skill, requiring for *adequate* qualification, a superior preliminary training of the intellect, and a large amount of proficiency and knowledge, while both have in common their measure of deficiencies and wants, and their drawbacks. When thoughtful and high-minded men are conscious of these, and keenly feel shortcomings and abuses, and call for improvement and reform, they should, when confronting so great evils, bear with real or fancied or overrated minor wants, avoid and discountenance unavailing antagonism, and gain and cherish strength by advancing friendly and auspicious mutual relations between physician and pharmacist. They certainly will meet, in their honest and well-directed efforts, with due appreciation, encouragement and support. In consideration, however, of the privileges equally secured by our national constitution to every individual, and conceding a wide scope for licence, all that can be aimed at and realized, in order to remedy and counteract the consequences, may be the legislative enactment and subsequent maintenance of an adequate standard of qualification in every individual inside of the professions.

Upon the relations between medicine and pharmacy well informed men need, on this occasion, no further comment, while the personal relations between physician and pharmacist invariably rest on the level of education, culture and character in the individual. For shortcomings in this respect the professions, of course, cannot be held responsible.

RESEARCHES UPON BUCHU.

BY PROF. E. S. WAYNE.

Buchu from the examinations of previous analysts has been shown to contain an ethereal oil in small quantity, and also that this oil contained a camphor which could be separated from it by exposure to cold. No other proximate principle peculiar to the drug has been proven to exist in it.

In handling large quantities of this drug in a manufacturing way, I have noticed some facts and peculiarities not mentioned by others, and find that the essential oil above mentioned, is not always so simple a body as stated.

Some time since, having occasion to distill off the remaining alcohol from a partially exhausted lot of buchu, I obtained in the last runnings of the still a quantity of oil of buchu, in all, about twelve ounces, and, upon examining it in various ways, I found that upon treatment with strong liquor sodæ, nearly one-half of the oil dissolved to a clear solution; this solution was separated from the oil unacted upon, and then neutralized by hydrochloric acid, which caused the separation of a white solid crystalline mass; this was thrown into a beaker glass and washed with water, then dissolved in boiling water, and set aside for results. Upon examining the same some time afterwards, I found that the whole had assumed a highly crystalline state, was colorless, and resembled salicylic acid in form; and upon examining them furthur, found that they were in fact that acid, and gave all the reactions for that substance, and with ferric chloride gave the beautiful color reaction, a deep purplish red. I was very much astonished at the result of my examination, and read a paper upon the same at a college meeting some six months ago, and should have published the same then, but wished to verify the above by further experiments, and since then have made several examinations, but not with the same results.

My next experiment was to distill with water 20 pounds of buchu; (in all these experiments the short variety was used) the oil collected and treated with soda as in the former experiment. I found that the oil obtained from this lot did not dissolve, or lose the same volume that the former did, but that a part formed a clear solution, which, upon being separated and neutralized with hydrochloric acid, became milky turbid in appearance; this was set aside over night, and in the morning the same was found almost transparent, and filled with a mass of long needle-shaped crystals—these were separated by filtration, washed with cold water, and suffered to dry on the filter—they were tested in solution in water, with negative results, except with nit. silver and ferric chloride; that of the ferric chloride was very marked and decided; upon addition of this reagent to the colorless solution it caused an intense blueish black color even in very dilute solutions, as decided as that of salicylic acid with this reagent, but of a different color.

Failing in this experiment to obtain the same results as in the former, and thinking over the matter, thought that probably the alcohol might have caused some change in the former; a quantity of fluid extract of buchu, about six pints, was distilled with the addition of water. I obtained only a small quantity of oil, which, in every respect, gave the

same reactions as with that obtained by distilling the buchu with water. With this experiment the investigation was left at rest, until this Fall, when it was again taken taken up, and whilst engaged in it, Mr. Wm. M. Thompson, of W. H. Merrell & Co., brought me as curiosity a few crystals of a substance that he said was obtained in attempting to distill off the alcohol from a lot of buchu magma. I immediately recognized them as being the same substance I found in the two last experiments; and learning from him that the whole was just about the same as the mass that I had originally distilled, and found salicylic acid in the oil, I made a request of Messrs. W. H. Merrell & Co., through him, that the same be placed at my disposal, to which they kindly consented. I received a barrel about three-fourths full of the magma, and distilled it with water. I obtained from it a portion or all of the alcohol, and by continuing the distillation and cohobating the watery distillate obtained six gallons of a milky distillate, but only slight traces of oil floating upon it. This distillate was set aside over night, and upon examining the same in the morning, found there had formed nearly two inches deep upon the bottom of the vessel holding the liquid, a mass of long needle-shaped crystals, some an inch and a half long; the supernatant liquid was syphoned off, and the crystals then collected on a filter. These were tested as the former, and with ferric chloride gave the same dark bluish-black color. The water syphoned off also gave the same, and the alcohol distilled from the magma gave the same result. I obtained no oil to test for salicylic acid, and could not detect it in any of the distillates. From this lot of buchu I have obtained nearly three ounces of this crystalline body, in long needle-shaped colorless crystals, having an odor indicative of their origin, yet different. What it is, I am not yet able to say, but shall examine it more fully and report at some future time.

Buchu, from what has been shown, evidently contains some substance, that by its chemical change, will yield salicylic acid, and probably it is the crystalline body I have found in the three last experiments. This is sparingly soluble in water at ordinary temperatures, freely at the boiling-point; which solution upon cooling, becomes turbid from separation of oil drops, which afterwards turn to crystals soluble in alcohol and ether; and the aqueous solution with ferric chloride forms an intense, I may say, inky blue color, so intense as to render the solution opapue even in a test tube half an inch in diameter.

Nitrate of silver also occasions a precipitate of a purplish color, deeper than that of chloride silver, exposed to the action of light.

Cincinnati, Dec., 1875.

ON SOLUTIONS OF MOLYBDIC IN SULPHURIC ACID AS A REAGENT FOR ORGANIC PRINCIPLES.*

BY HENRY S. WELLCOME, PH. G.

Dr. Regnald Southey, Physician to St. Bartholomew's Hospital, London, in his report for 1874, (vol. x, p. 303), announces, as a new test for opium, a solution of molybdic acid in sulphuric acid. The following is an abstract of his statement: "A new test for opium; a color test, at once so characteristic and intense, of such easy applicability and such extreme delicacy, that it needs only to be more generally known in order to be often employed; molybdic acid dissolved in pure sulphuric acid is the testfluid; a saturated, or, at all events, a strong solution should be made. The reaction is produced by morphia in opium, not by the meconic acid; the latter undergoes no change with the reagent; the former, in *minutest quantities*, at once furnishes *characteristic* reaction. The best mode of proceeding is to place a drop of the suspected fluid side by side with a drop of the test fluid, by means of a glass rod; at once, if morphia, or any of its salts, be present, a beautiful deep maroon color will be presented, when the fluids are brought in contact; the color changes after a while, becoming, first deep purple, and then gradually losing its red element, and becoming dark, and later, a brighter blue. In evidence of the minuteness of this test I may adduce the following facts: *The reaction is distinctly* obtained with a single drop of pharmacopœial *tinct.* opii, as also with the compound *tincture* of camphor.

"*The presence of a good deal of impurity, and of alien organic matter, does not interfere much with it.* Of this I feel *confident*, that the busy practitioner will *hail* this *new discovery*, which *enables him to detect laudanum or morphia* in the dregs of bottles, brought to him to test, and in fluids vomited, and to *swear to its presence with positive security*. I was enabled to detect the $\frac{1}{40}$ grain of morphia, as presented in the morphia lozenge of our pharmacopœia."

It is an error that *such tests* are published, especially for determining the presence of so important a principle and so common a poison as morphia, and with the commendation of one whose position should warrant authority and reliability. We should be sorry to learn of Dr. Southey's swearing to the presence of opium or morphia, his findings based upon this test alone, in a chemico-legal poison case, where a

* Read, December 7th, before the Monthly Meeting of the New York Alumni Association of the Philadelphia College of Pharmacy.

person's life or liberty was depending upon his testimony. The test is *not* characteristic; there are many other organic bodies which yield the same color with the reagent, and the presence of other organic matter *does materially interfere* with the reaction, varying according to its character. He states that he was able to produce the reaction with a single drop of tinct. opii or tinct. opii camph., he could as well produce the same reaction with any other tincture, and even with pure alcohol; but they give a bright purple color, changing to blue, and not the maroon, which is produced by pure morphia, and similar bodies.

Mr. Buckingham, in "American Journal of Pharmacy," 1873, p. 150, proposed a solution of molybdate of ammonium, eight grains, in sulphuric acid, two drachms, as a test for some organic bodies, giving a table, showing the changes of color produced by the most important alkaloids, and, while his results show that his experiments were conducted with care, yet he overlooked the fact that those colors vary according to the condition under which the test is applied. Prescott, in his new and valuable little work on proximate organic analysis, p. 144, devotes much space to Frœhde's reagent, which is a solution of molybdate of sodium, 0·01 grain, in concentrated sulphuric acid, 10 cc., and gives a table showing the reaction with the reagent, and with pure sulphuric acid. I do not think that the indications which he presents there were proven with proper care; he states that morphia is colorless with concent. sulphuric acid—it gives a wine-red color. These test solutions of molybdic acid, or molybdates in sulphuric acid, all give like reactions, (varying slightly in intensity of color). My experiments prove them to be unreliable, and therefore worthless, for determining the presence of the alkaloids; for instance, pure quinia gives little or no color, but some of its salts at once yield a reaction; bromide and iodide, deep blue; ferrocyanide, red; tannate, red-brown.

The maroon color which Dr. Southey produced with morphia, and is produceable with other bodies, is caused by the red color, given with the sulphuric acid, blending with the blue hydrate of molybdenum, which is formed by the reduction of molybdic acid and the molybdates, when brought in contact with certain organic matters; the variable green color is produced by blending with the yellow color given to many organic bodies by the action of sulphuric acid, and when these solutions produce a red, yellow or brown coloration, with an organic principle, the reaction is simply with the sulphuric acid, the molybdates taking no part in it.

Solution of the proto-salts of tin, zinc or copper, yield a deep blue color with the molybdates.

There is no more need of molybdic acid, or molybdates, in these test solutions than for the presence of any other blue coloring matter, which will blend with the color produced by sulphuric acid, and produce tints which, while pleasing to the eye, confuse the analyst.

LABORATORY NOTES.

BY E. S. WAYNE.

Damiana.—A quantity of this new remedy, purchased in New York, and similar to that figured as No. 3 in the November (1875) "Journal of Pharmacy" (page 578), was made into fluid extract. The drug was exhausted with 76 per cent. alcohol. The filtered extract, upon standing for several days in a glass vessel, deposited all over that part of the vessel filled with it, a crystalline crust. The extract was poured from the bottle and crystals removed, which upon examination were found to be, not a proximate principle, as I expected, but chloride of potassium.

Eucalyptus globulus.—In the preparation of the fluid extract of this substance, I have not been able to obtain a preparation that would not in a short time form a copious precipitate, supposed to be chlorophyll. The green appearance of it warranted that opinion, but when separating it from the extract, and examining it, I found that chlorophyll formed only a small part of the mass. I dissolved the precipitate in alcohol, filtered it through bone black, and obtained a light-colored solution, free from the green chlorophyll. This was then treated with an alcoholic solution of plumbic acetate, which was added as long as it gave a precipitate; this was filtered, and sulphydric acid passed into the filtrate, to remove excess of lead. After removing the sulphide of lead, the filtrate was placed in a loosely covered vessel, to evaporate spontaneously. As the alcohol evaporated, crystals began to form on the sides of the bottle, and by slow evaporation a confused crystalline mass was obtained, retaining the peculiar odor of the substance. I could not make out the crystalline form, but removed the crystals and reduced them to a powder, the color a pale ochre tint. The substance is soluble in ether and chloroform; its alcoholic solution gives, with ferric chloride, a dark brownish-red color. The precipitate consequently contains, besides chlorophyll and tannic acid, a peculiar crystallizable acid resin, which gives a brown-red reaction with ferric chloride.

ALOIN.

BY CHARLES L. MITCHELL, PH. G.

(*Read at the Pharmaceutical Meeting, Dec. 21st, 1875.*)

The subject of aloin having lately been again brought to the notice of the pharmaceutical world by the experiments of Mr. Tilden, it occured to the writer to undertake some experiments on aloin, in order to ascertain if a good article could not be prepared by some reliable process, not too difficult for general adoption.

The grades of aloin, as found in the market, have occasioned much distrust of its value as a medicine, on account of the unreliability and uncertainty attending their use, very often being almost inert. Aloin, when of a good character, is a very safe and efficient cathartic and purgative, acting freely in doses of from 1 to 3 grs. It affords a convenient and efficacious method of obtaining the remedial effects of aloes in a concentrated form.

In making these experiments the process of Mr. Tilden (*Am. Jour. Pharm.* 1871.) was followed. "One pound of good Barbadoes aloes was broken up and dissolved with heat in 1 gal. water, acidulated with f℥ss sulphuric acid, and after perfect solution, was set aside for twenty-four hours to cool. The supernatant, clear liquid was poured off from the resin (which is comparatively inert), and evaporated by a gentle heat to about 2 pints, and then set aside for several days. On examining the liquid at the expiration of that time, a heavy crystalline deposit of a yellow color was found on the bottom and sides of the vessel. This was collected on a filter, washed with a little ice-cold water to remove coloring matter, well drained and dried. This aloin is rather impure. It can be rendered quite pure by dissolving it in warm water, decoloring with animal charcoal, and again evaporating and crystallizing.

Aloin, thus obtained, is of a yellow color, crystalline, and of an extremely bitter, aloetic taste. It is slightly soluble in cold water, very soluble in hot water, and soluble in alcohol. The yield was about 600 grains.

Some of this aloin was made up into pills, and it purged actively in doses of 2 grs.

The liquid from which the crystalline deposit had been separated was evaporated to extract consistence, yielding about 10 ounces of a very good article of extractum aloes.

The main point to be considered in the preparation of a reliable article of aloin, is the selection of a good grade of aloes. Barbadoes

aloes is generally the best, on account of the aloin obtained from it, being much more easily separated and more active, than that obtained from the other varieties of aloes. Natal aloes, lately quite prevalent in the market, also affords an extremely handsome "looking" article of aloin, but unfortunately it, as well as the aloes itself, is very weak in its action; 15 and 20 grs. of the aloin having been taken with the result of only a slight purgative action.

The writer also examined an article of aloin prepared from a grade of aloes, called Curaçoa; but this was also quite weak in its action.

The best means of detecting the nataloin is by its reaction with strong sulphuric acid, and the vapor of nitric acid, as proposed by Histed. Add a few grains of the suspected aloin to several drops of strong sulphuric acid, and then pass a glass rod, moistened with strong nitric acid, gently just over its surface. The presence of nataloin will be indicated by the blue color which immediately results. Barbaloin can be detected by its reaction with strong nitric acid, giving a red color.

WAFER CAPSULES AS A MEANS OF ADMINISTRATION OF MEDICINES.

BY WILLIAM M^cINTYRE, PH. G.

(*Read at the Pharmaceutical Meeting, December 21st.*)

In the "American Journal of Pharmacy," 1873, page 190, and 1875, page 213, notices have appeared describing such wafer envelopes or capsules.

Recently attention has been specially directed to the advantages of this method, and there have appeared in the market wafer discs and presses to enable the druggist to dispense them. The want of information as to their production and the expense attending upon the press has proven a barrier to their general introduction.

The plan consists in having two small concave wafer discs to fit each other in such manner that when joined a perfectly sealed envelope or capsule is formed, thus rendering feasible the administration of such medicines as are free from moisture, in a tasteless and odorless manner, also allowing the presentation in one envelope of two substances, separated by a middle leaf of wafer paper, with the intention that they unite in the stomach, and form a salt in the nascent state.

It is possible to secure all these advantages by means of apparatus

and wafer discs that can be prepared by any one at a very trifling outlay.

To prepare the capsules, the mode of proceeding is as follows: Procure wafers in sheets such as are used by fancy-cakes-bakers. Cut them into circular pieces by means of a hollow punch. One of these is slightly dampened by placing it between wet muslin cloths, removed and inserted between two tin plates which have been prepared of the desired shape of the finished disc; after pressing together the plates, the wafer will have received the desired impression and is ready to receive whatever suitable combination the physician may desire to prescribe.

I have, however, found wafer sheets which could not be moistened and worked to advantage in this way; but these can be managed without this treatment, if the tin plates are heated, the flat wafer inserted, and pressure applied as before.

These latter have a highly polished surface, and can be manufactured with greater rapidity than the former.

The use of the press is to seal the wafers. This is accomplished by properly moistening the internal surface of the rim of one wafer, upon which has previously been placed the medicine, and covering this with another, and submitting to pressure. This moistening is done by an apparatus formed by taking two hollow metallic cylinders, differing in diameter, enclosing one within the other and filling the intervening space with round lampwick or flannel cloth, which is allowed to slightly project. This is moistened by applying it to a piece of flannel which has been previously wetted; or one of the discs may be pressed upon a moistened cloth until the rim is in such condition that when applied to the filled disc it will adhere.

Our fellow-member, E. M. Boring, has devised a press which

answers all requirements, and is yet so simple in its construction that any one can, in a short time, with comparatively no expense, make one.

It consists of two pieces of one-and-a-half-inch hardwood board,

two inches wide and nine inches long, joined together at one end with a good hinge. The pressing surfaces consist of concave pieces of brass or metal, having a rim corresponding to the various sizes of wafer discs sunk to a proper level and fastened into the body of the press. For these, buttons for stair-rods answer every purpose.

The medicated capsule is now ready for the patient, who will be thus enabled to take such bitter substances as quinia, aloes, &c., without perceiving the least taste whatever, and requiring very little effort to swallow, all that is requisite being to dip the wafer for a moment in cold water, place it upon the tongue, and swallow with a very small drink of water.

VINEGAR BITTERS.

BY OTTMAR EBERBACH.

(Abstract of a paper presented to and published by request of the American Pharmaceutical Association, Sept. 1875.)

The appearance of this compound reminds one very forcibly of a mud-hole in clayey soil, for it looks as if it was taken from such a depository and bottled; this, probably, explains why the proprietors have their wrappers so firmly fixed over their unsightly mixture. On opening the bottle it gives a slight report, indicating the presence of some gas; its odor is that of a mixture of oil of anise and aloes, its taste sour, very bitter, with an anise flavor.

To determine the composition of this nostrum, the author subjected the contents of a bottle to distillation, passing the gas through an ammoniacal solution of barium chloride, in which a white precipitate was produced (carbonic acid). The distilled liquid was found to contain oil of anise, acetic acid and alcohol, the presence of the latter being proven by the acetic ether and iodoform tests.

The balance of the contents of the bottle was neutralized with ammonia, evaporated to dryness, and the residue exhausted with absolute alcohol; insoluble portion marked A, soluble portion, B. The latter was exhausted with cold water; the solution, after long-continued boiling with dilute sulphuric acid, yielded to ether paracumaric acid, recognized by its solubility and the golden yellow color produced with ferric chloride; the presence of aloes was thus proven.

The portion of B, which was insoluble in cold water, was partly soluble in chloroform; the remainder, dissolving in solution of carbonate of sodium, was free from the resins of colocynth and jalap, and con-

sisted of resin of aloes. The chloroformic solution left, on evaporation, a residue which was soluble in boiling solution of sodium carbonate, and reprecipitated by sulphuric acid as dirty yellowish flakes, which were indifferent to carbon bisulphide (absence of gamboge), but dissolved in alcohol, and then yielded with ferric chloride, chlorine water and bichromate of potassium the characteristic green coloration of guaiac.

In the residue A, the presence of sulphuric acid and soda was easily proven. A portion of it was dissolved in water and precipitated by strong alcohol. In a portion of this the presence of sugar was indicated by Trommer's test; another portion of the watery solution was turned milky by oxalic acid and gelatinized by concentrated solution of ferric chloride; presence of gum arabic.

Summing up the results, we find that this humbug is composed of the following rare native herbs of the West, as collected by such Indians and associates as Dr. J. Walker, viz., Cape aloes, Glauber's salt, gum arabic, gum guaiac, acetic acid, carbonic acid, alcohol and oil of anise.

GLEANINGS FROM THE FOREIGN JOURNALS.

BY THE EDITOR.

Citrate of Lithium, prepared in accordance with the British Pharmacopœia (100 parts of carbonate of lithium and 180 parts of citric acid), has, according to C. Umney, a distinct alkaline reaction, while that made by the United States formula (100 carbonate of lithium to 200 citric acid) is strongly acid. 100 parts of pure carbonate of lithium will be required to neutralize 189·2 parts of citric acid, the product of anhydrous lithium citrate being identical with the amount of citric acid employed. If commercial carbonate of lithium of fine quality contain 98·5 per cent. of real carbonate, then the proportions would be 100 parts of carbonate and 186·5 parts of citric acid. Lithium citrate, prepared from these proportions and rendered anhydrous, was neutral to test-paper. A solution of specific gravity 1·230 when set aside produced crystalline citrate of lithium, which appears to have the formula $Li_3C_6H_5O_7+4H_2O$ at 100° C. (212° F.); this salt loses three molecules of water, the fourth being given off at 115° (239° F.), leaving about 73 per cent. of anhydrous citrate. Ten commercial samples were examined; they left, when dried at 100° C., residues varying in weight between 76·5 and 85·2 per cent., and at 115° C. from 72·9 to 83·8

per cent. of anhydrous citrate. Mr. Umney advocates the adoption of the crystallized salt, which is thoroughly definite and reliable and whose appearance would guarantee its uniformity. The definition of "delinquescent," applied by the two pharmacopœias, is inaccurate.—*Pharm. Jour. and Trans.*, 1875, Sept. 11.

Bromide of Lithium is prepared by Yvon by mixing 37 grams of carbonate of lithium, 200 grams of distilled water and 80 grams of bromine, and passing a current of sulphuretted hydrogen through the mixture until the color of bromine has disappeared. A slight heat is then applied to drive off excess of sulphuretted hydrogen and to agglutinate the sulphur. After filtration, the liquor is concentrated and finally crystallized by desiccating it under a glass over sulphuric acid.

It may also be obtained by double decomposition. Sulphate of lithium is first formed by treating 37 grams of carbonate of lithium with 49 grams of monohydrated sulphuric acid, diluted with its own volume of water. On the other hand, 119 grams of potassium bromide are dissolved in the smallest possible quantity of water. When the two solutions are mixed, an abundant precipitate of potassium sulphate is produced and increased by the addition of a little alcohol. The whole is evaporated to dryness, finishing the operation on a water-bath, and the residue is treated with alcohol which removes only bromide of lithium and deposits it again on evaporation. The bromide may then be crystallized from water or kept in solution of known strength.—*Ibid.*, Sept. 18.

Combinations of glacial acetic acid with oils.—As a continuation of his paper on the solubility of alkaloids in oil ("Am. Jour. Pharm.," 1875, p. 540), Mr. J. B. Barnes communicates the following results of his experiments.

The *minimum* combining proportions of the following five commercial samples of oil are, for one volume of glacial acetic acid, almond oil 7 vol., olive oil, 8 vol., codliver oil, 7 vol., linseed oil 7 vol., and oil of rhodium 4 vol.

The *maximum* combining proportions of the next five are, for one volume of the acid, oil of turpentine, ½ vol., oil of lemon, 2 vol., oil lemon grass, 2 vol., oil of lemon grass, 2 vol., oil of copaiba, $\frac{1}{20}$ vol., oil of juniper, 1 vol.

The following 41 oils will mix with glacial acetic acid in all proportions: castor, cloves, croton, caraway, rosemary, sandal, cajeput,

orange, bergamot, anise, almonds (bitter), origanum, chamomile, eucalyptus, sage, cinnamon, cassia, lavender, myrtle, marjoram, pennyroyal, citronella, pimento, sassafras, calamus, spearmint, wormwood, neroli cubebs, coriander, cumin, peppermint, geranium, male fern, citron, fennel, rue, savin, amber, nutmeg and essential oil of mustard.—*Ibid.*

Preservation of Hydrocyanic Acid.—Mr. John Williams has continued his experiments on the preservative influence of glycerin upon hydrocyanic acid (see "Am. Jour. Phar.," 1874, p. 487). Two samples, of ten fluidounces each, and containing respectively 4·5 and 2 per cent. of acid, were put in pint bottles, glass stoppered, but not tied over or inverted; each contained 20 per cent. of Price's pure glycerin. The bottles were opened after six and twelve months, and the acids were found not to have diminished in strength or altered in appearance. German glycerin was found to assume a yellow color with hydrocyanic acid.—*Ibid.*, Sept. 25.

Syrup of Tolu.—Regarding the resin of tolu as the main or sole active principle, Henrotte is in favor of retaining it in the syrup, and effects its permanent emulsion in the following manner: 10 grams of finely-powdered tragacanth are triturated with sufficient simple syrup to form a mucilage; 40 grams of tincture of tolu are added and an emulsion made, to which enough simple syrup is added to make the whole weight 1,000 grams.—*Jour. de Phar. d'Anvers*, 1875, p. 337–339.

Administration af Raw Meat.—Dr. Lailler proposes to mix 100 grs. of grated raw meat with 40 grs. of powdered sugar, adding afterwards 20 grs. of Bagnols wine (sparkling?) and 3 grams of tincture of cinnamon. This mixture has an agreeable taste and is easily digested.—*Jour. de Phar. et de Chim.*, 1875, Nov., p. 367.

Solubility of Borax in Glycerin—According to Gandolphe, glycerin dissolves, at the ordinary temperature, its own weight of borax by triturating them in a mortar, or more rapidly by applying the heat of a water-bath. This solution which keeps unaltered is well adapted for mouth washes after the addition of some clarified honey or honey of roses. 100 parts of water dissolve only 8·33 parts of borax. Boracic acid is likewise more soluble in glycerin than in water, but not to the same degree as borax.—*Ibid.*, from *Union Phar.*

Test for Sulphocarbonates.—A. Mermet proposes for this purpose an

ammoniacal solution of sulphate or chloride of nickel, diluted with water until it appears colorless. A few drops of a solution of sulphocarbonate will produce with the reagent a very characteristic currant color; while liver of sulphur, which is occasionally sold as sulphocarbonate, produces a yellow, and the alkaline monosulphides a brown or black color.—*Ibid.*, p. 352.

Devorative Capsules.—Under this name, the chemical factory of Helfenberg, near Dresden, has introduced capsules which are made of a material similar to sheet wafers, but rolled out very thin like vellum paper. It is used like ordinary powder paper, except that after the powder has been put upon it the length margin is moistened with water by means of a hair pencil; it is then folded in the usual way, the ends being likewise fastened by the aid of moisture. The entire capsule with contents is swallowed after having been dipped in water and, if necessary, rolled up.—*Phar. Centr. Halle*, 1875, No. 42.

REPORT ON THE DEVELOPMENT OF THE CHEMICAL ARTS DURING THE LAST TEN YEARS.*

BY DR. A. W. HOFMANN.

(Continued from page 559 of last volume.)

HYDROGEN.

Of the three properties to which the industrial applications of hydrogen are applicable two are of so striking a nature that they cannot have escaped the earliest observers. To them it appeared as the combustible principle, the "volatile sulphur;"† subsequently, it was regarded as the long-sought-for phlogiston,‡ or as the "inflammable air," of which all combustible gases were mere varieties. In modern times, this previously vague knowledge has been rendered definite, recognizing in hydrogen the greatest heat of combustion, and consequently the property of producing the highest degrees of heat and light, properties which met with a practical application at an early date.

The low specific gravity of hydrogen did not escape the earliest observers. Being scarcely ponderable, it excited the idea of imponderable bodies, and its specific lightness, as well as its great heat of combustion, soon met with a striking application.

A third attribute is of a less manifest nature. Occasionally destroying colors, but often obtained without any brilliant and striking phenomena, hydrogen in its nascent state is capable of entering into many combinations, of which it is incapable when pre-existing in a free state. It liberates chlorine, oxygen, and other elements from their compounds, and takes their place; or it is deposited in compounds not fully saturated, and fills up the vacancies. This attribute is most weighty for the

* "Berichte über die Entwickelung der Chemischen Industrie Während des Letzten Jahrzehends."

† Lemery, "Memoires de l'Academie," 1700.

‡ Cavendish, 1766.

most recent developement of chemistry, as well as of great technological importance. Unawares, this property has been made use of for ages. Upon it depends the transmutation of indigo-blue in the vat into indigo-white, and, consequently, one of the oldest and most important branches of the art of dyeing.

In 1842, Zinin succeeded in converting nitrobenzol into anilin by the action of nascent hydrogen, and thus opened out an industrial region of unimagined extent. The era of the artificial dyes followed. It was soon perceived that many of these substances shared with indigotin the property of being decolorised by hydrogen, and thus zinc-powder was introduced into calico-printing as a discharging agent, which, developing hydrogen in patterns where it is printed on, remove artificial coloring matters, *e.g.*, magenta.*

A series of interesting observations showed, however, that the manner in which hydrogen is evolved is not without influence on hydrogenisation. Whilst ammonium sulphide, and whilst acids under the influence of metals give up so much hydrogen to nitrobenzol as to form anilin; if other sources of hydrogen are employed the reaction is arrested half-way, and intermediate products are generated. Herewith, therefore, nascent hydrogen escapes from our general consideration, and its technical application will be described in future parts of this report.

We return, therefore, to its applications as a source of heat and light. It has been briefly described in the section on oxygen how the oxyhydrogen blast was evolved from the experiments of Saron between 1780 and 1790, and how it was introduced in the manufacture of platinum in the middle of the present century by Deville and Debray. Since 1838† Desbassains de Richemont found in hydrogen mixed with air the means for the autogenous soldering of sheets of lead, and thus supplied the sulphuric acid manufacture with the fundamental condition of its growth, *i.e.*, permanent lead chambers of any desired magnitude. If, in places where coal-gas is readily procurable, this combustible is substituted for hydrogen in soldering lead, many sulphuric acid chambers are not near gas-works, and in them hydrogen is still necessary for soldering. The same must be said on the application of hydrogen for the autogenous soldering of other metals and alloys, a process for which Winckler, in his convincing essay already quoted, predicts a great future. More recently, lead pans soldered in this manner have been introduced in the manufacture of boracic acid in Italy. Numerous conflagrations, especially that of Canterbury Cathedral in 1871, and that of the Alexandra Palace on Muswell Hill in 1873, demonstrably due to the braziers full of fire used in soldering the leaden spouts, have led, in England, to the proposal to solder leaden roofing and spouting with hydrogen.

How far hydrogen is superior to other kinds of fuel appears from the following table. According to the experiments of Favre and Silbermann, 1 grm. of the following bodies, when burnt in water, gave the appended number of calorics, *i. e.*, it raised, by 1°, the temperature of the given number of centigrams of water.‡

* The transformation of the colored salts of rosanilin into the colorless salts of leucanilin by means of zinc and hydrochloric acid, was discovered by A. W. Hofmann, in 1860,—*Proc. Roy. Soc.*, vol. xii., p. 2. The above application is due to Durand. See Schützenberger, "Traité des Matières Colorantes," vol. i, p. 491.

† Karmarsch, "Geschichte der Technologie," 380.

‡ A. Würtz, "Dictionnaire de Chimie," vol. i, pp. 825, 826.

Hydrogen,	34·462
Carbonic oxide,	2·403
Oil of turpentine,	10·852
Stearic acid,	9·716
Alcohol,	7·814
Marsh-gas,	13·063
Wood charcoal (burnt to carbonic acid),	8·080
Ethylen,	11·858
Ether,	9·028

The temperature of the flame does not, however, depend exclusively on the heat of combustion. The density of the burning body and the specific heat of the products of combustion must also be taken into account. Hence it comes that the temperature of the hydrogen flame in pure oxygen is about 6800°, in air about 2600°; the temperature of the flame of carbonic oxide in oxygen amounts to 7000°, in air about 3000°;* further according to calculation 1 vol. of hydrogen = 1 grm. is capable of fusing 205 grms. of platinum, whilst the same volume of carbonic oxide can fuse 238 grms. of platinum (melting-point, 2000°). In practice, however, even under the most favorable conditions, as Deville and Debray determined in their researches on platinum, about half the heat is lost by conduction to the furnace and other surrounding matter, and the above authorities with 120 litres of hydrogen and 60 of oxygen succeeded in fusing only 1 kilo. of platinum instead of double the amount as calculated. Platinum can also be smelted and refined under similar circumstances with coal-gas. But for the more infusible metals of the platinum group, iridium, ruthenium, and their alloys, the hydrogen flame must be retained, which, if costlier than coal-gas, is cheaper than carbonic oxide.

In the use of gases as fuel, the metal itself can be brought in contact with the flame, which is impracticable in case of carbon, and thus the great loss of heat is avoided which ensues when the crucible is heated from without. Their application renders it also possible to inspect the condition of the metal at any moment. In the metallurgy of the common metals these two advantages do not come into consideration. Carbon, moreover, is not only the cheapest but the most productive fuel,† and the application of hydrogen as a source of heat seems therefore limited to autogenous soldering and to the fusion of the most refractory platinum metals.

The property of platinum-black to ignite hydrogen, of which Döbereiner made a well-known and widely utilized application in his hydrogen lamp in 1823, has lost its practical importance owing to the discovery of friction matches.

The more intense and permanent was the interest which hydrogen created as a source of light.

As the luminous power depends on the temperature at which a solid ignited body is maintained, the suggestion was near at hand to produce an intense light by means of this gas, in which an incombustible body was heated to whiteness. To this end the Scotch military engineer Drummond used in 1826 cylinders of caustic lime heated in the oxyhydrogen flame. The Drummond light has been widely employed,

* Debray "Sur la Production des Températures Elevées et sur la Fusion de la Platine." Lecons de Chimie en 1861, 65; Paris, 1861.

† The calculated temperature of the flame of carbon in oxygen is 10,000°, from which has to be deducted the unknown amount of heat which at this temperature is lost by dissociation. See Debray, *opus citat.*

not merely in geodetic measurements and in lighthouses, which the inventor had principally in view, but also for projections of microscopic objects and photographic images on glass, or drawings upon gelatin for demonstration in lecture-halls,* for dissolving views, and chromatropes. In the American civil war it was used in sieges to light up forts.† The English war department has tried it in barracks, in large halls and courts, in which‡ it is said to have proved cheaper than coal-gas, whilst the smallest characters could be read at a distance of 90 metres from the source of light.

Since lime partially loses its luminous power by continued use, platinum-wire, magnesia, and latterly zirconia, have been employed in its stead.§

The above-mentioned application of the hydrogen lamps are, however, of a very limited nature. To utilize it on the large scale for street lighting, the simultaneous use of oxygen has been laid aside, and cheaper methods of preparation have been sought for. For this purpose advantage was taken of Felice Fontana's method of decomposing water by means of ignited iron and ignited carbon, as proposed in 1780.‖ On the latter scheme Donovan founded his industrial preparation of hydrogen gas in Dublin, in 1830. His process has been repeatedly described with modifications, referring in part to the needful apparatus, and in part to the diminution of the proportion of carbonic oxide. The presence of this poisonous gas was at first justly urged as an argument against the use of the "water gas." Langlois found that the mixture obtained—on allowing steam to pass over iron retorts filled with red-hot coke in Kirkham's apparatus—had the tolerably constant composition of 58 to 60 per cent. of hydrogen, 19 to 26 carbonic oxide, and 15 to 20 carbonic acid.

It was subsequently, however, discovered¶ that at higher temperatures carbonic oxide is oxidized by watery vapor to carbonic acid, so that if the steam is in excess a gas may be obtained relatively free from carbonic oxide, as shown in the reaction $-C+2H_2O=4H+CO_2$. In the water-gas prepared at Narbonne, where the gas on issuing from the retorts is conducted through ignited tubes along with fresh quantities of superheated steam, Verver** found in 1858, 3·54 per cent. of carbonic oxide. According to other observers the amount ranged from 2·5 to 5 per cent. In the water-gas at Passy, Payen found 6 per cent. of carbonic oxide, whilst in ordinary coal-gas he found an average of no less than 14 per cent. The above-mentioned objection, therefore, no longer holds good.

The carbonic acid is removed by milk of lime, or, perhaps, more economically, according to the suggestion of Heurtebise†† by soda, which is thereby converted into bicarbonate, a readily saleable substance.

Fayes‡‡ constructed for lighting the town of Narbonne an apparatus which he

* This Report, Nov., 1875, p. 509; also H. Vogel, "Ber. d. Chem. Gesell.," iii, 901.

† Wagner, "Lehrbuch der Technologie." 9th edit., ii, p. 377.

‡ "Journal of Gas-lighting," 1869.

§ See the work of Phillips, quoted above.

‖ *Mem. Soc. Ital.*, xv.

¶ Bromeis, *Zeitsch. d. Ver. deutsch. Ing.*, iii. 82, and *Dingler Polyt. J.*, clxiv. 33, 1859.

** B. Verver. "L'éclairage au gaz à l'eau à Narbonne et l'éclairage au gaz Leprince." Leiden 1858. See Bromeis, *opus citat.*

†† Heurtebise, *Dingl. Pol. J.*, cxxcvi. (?), 393, 1867.

‡‡ Fayes, *Genie industriel*, 1868, 329. *Dingl. Pol. J.*, clix. 47.

named gasogen, which furnished in twenty-four hours 1,000 to 1,200 cubic metres of purified gas, the cost of which, independent of labor, and of the cost and depreciation of plant, he calculates as follows:—

For 100 Cubic Metres of Gas.

			f.	c.
75 kilos of	coke at 0·03 franc	. . . .	2	25
55 "	coal at 0·025 "	. . . .	1	37
82 "	lime	. . . . .		82
			4	44

The material costs, therefore, 4½ centimes per cubic metre.

Instead of decomposing water by carbon, certain other processes have recently come into use, and require notice.

Lenoir's process,* suggested in 1867, is of very limited applicability. He decomposed barium sulphide with water, obtaining sulphate of baryta and hydrogen—$BaS+4H_2O=BaSO_4+4H_2$. This process is only practicable where the manufacture of barium sulphate (permanent white) is the main object, and the hydrogen a by-product, as was the case with Lenoir.—*Chem. News*, Sept. 17 to Oct. 8.

VARIETIES.

VEGETABLE MUCILAGE. By W. Kirchner and B. Tollens.—The authors, after a critical review of the various investigations that have been made in connection with this subject, describe their process for the purification of the mucilage, which is very similar to Schmidt's. The mucilage, after the addition of hydrochloric acid, is precipitated by alcohol and, when the operation has been repeated six or eight times, the product is repeatedly washed with absolute alcohol, and finally with ether. By this means the ash is reduced to a minimum, and the mucilage, when dried, is obtained as a porous mass, and not in hard lumps.

Quince mucilage was obtained principally from quince seeds, by digesting them in water for four hours, then rubbing them through a hair sieve, boiling, and straining through linen. After purification it is greyish-white and swells up, when soaked in water, to a gelatinous mass, forming a mucilaginous solution only on the addition of a small quantity of potassium hydrate. It still contains 4 to 5 per cent. of mineral matter, and on analysis gives numbers corresponding with the formula $C_{18}H_{28}O_{14}$. When it is boiled with dilute sulphuric acid, white flocks are precipitated, and sugar and dextrin or gum are produced. From the results of numerous carefully conducted quantitative experiments, it would seem that the flocculent precipitate of cellulose is nearly constant after the first half-hour, however long the boiling may be continued, but the percentage of gum gradually decreases, whilst that of the sugar increases within certain limits, showing the conversion of the former into the latter. The gum polarizes lævorotary; the sugar, which reduces cupric solution, dextro-

* Lenoir, *Wagn. Jahresber.*, 1867, 219, 259.

rotary. The flocculent precipitate, amounting to about 36 per cent., gives the reactions of cellulose with iodine, but in the analysis the carbon comes out slightly higher than that required by the formula $C_6H_{10}O_5$. This is probably due to the presence of some impurity similar to the compound found in fir-wood by J. Erdmann.

Linseed Mucilage.—Linseed treated in a manner similar to that above described gave numbers corresponding with the formula $C_6H_{10}O_5$, or the same as that of cellulose. When boiled with dilute sulphuric acid, it decomposes like quince mucilage, but with much greater difficulty, gum and sugar being formed, and the former being gradually converted into the latter by long-continued boiling The insoluble residue is very much smaller than with quince mucilage, being only about 4 per cent.

Fleabane Mucilage.—This has the formula $C_{36}H_{58}O_{29}$. Boiled with acid, it decomposes like the other mucilages, yielding gum and sugar, but in this instance the gum is *completely* converted into dextrorotary sugar by long-continued boiling.

From these results the authors infer that in quince mucilage the cellulose exists in combination with the gum, since no cellulose can be distinguished as such by microscopical examination, and as the two substances exist in the ratio 1 : 2, it is most probably a true chemical compound:

$$\underset{\text{Cellulose.}}{C_6H_{10}O_5} + \underset{\text{Gum.}}{2C_6H_{10}O_5} = \underset{\text{Mucilage.}}{C_{18}H_{28}O_{14}} + H_2O.$$

It has yet to be determined whether the other two mucilages are distinct, or whether they are compounds of cellulose and gum in the proportion 1 : 2, mixed with excess of gum: the different behavior of the fleabane mucilage when treated with acid from that of the quince would, however, seem to preclude this view.

The concluding portion of the paper is occupied with theoretical speculations as to the manner in which the carbohydrates may become transformed, the one into the other—*Jour. Chem. Soc.* [Lond.], Nov., 1875, from *Annalen der Chemie*, clxxv, 205–226.

Mutual Displacement of Acetic and Formic Acids. By H. Lescœur.—It is generally known that formic acid can expel acetic acid from its combinations, but inversely acetic acid has been found also to displace formic acid. When a mixture of acetic acid and sodium formate is distilled, a very considerable quantity of formic acid is found in the distillate, but even with a large excess of acetic acid complete decomposition of the formate was never obtained.

The majority of the formates soluble in acetic acid are decomposible in like manner, some indeed without even the application of heat; thus, potassium formate dissolves in acetic acid, and if allowed to evaporate spontaneously, gives a residue consisting mainly of potassium acetate. There would appear, therefore, to be an equilibrium established between the quantity of formic acid set at liberty, and acetate formed in a manner similar to that which has been noticed in many other instances by different operators.

When one part of sodium formate is dissolved with heat in five parts of monohydrated acetic acid, crystals are obtained on cooling, which were found to have the composition, $NaC_2H_3O_2.2C_2H_4O_2 + NaCHO_2.2CH_2O_2$.—*Journ. Chem. Soc.*, November, 1875, from *Bull. Soc. Chim.* [2], xxiii. 259.

MINUTES OF THE PHARMACEUTICAL MEETING.

The third regular meeting of the session was held December 21st, 1875, Dr. W H. Pile in the chair. Number in attendance, sixty. The minutes of the previous meeting were read and approved.

Prof. Maisch presented to the library, on behalf of J. C. Rumph, a catalogue and price list of Materia Medica, "Catalogus et Valor Materiæ Medicæ, seu medicamentorum simplicium et compositorum in officinis Molhusinis prostantium," printed in 1715. Besides much curious information, it contains the oaths, as administered to apothecaries and physicians in the beginning of last century. Charles Bullock thought the disposition to present such works ought to be encouraged; they would be valuable for our library, as giving the antiquities of our business. Prof. Remington called attention to the suggestion that had been made by W. C. Bakes, of making a collection of pharmaceutical books and apparatus possessing historical interest. Wm. McIntyre presented a copy of "The Popular Health Almanac," and a press for sealing wafer capsules.

Prof. Remington read a paper on aloin, by Charles L. Mitchell, (see page 24). Prof. Maisch asked for further information, concerning the extract described as being made from the mother liquid after the separation of the crystals of aloin. Prof. Remington said it had the appearance of a good extract. Some members, however, thought that it should not be used for the extract of aloes, as officinal in some European pharmacopœcias. I. J. Grahame believed the results claimed for the administration of aloin, as a substitute for aloes, had not been realized. The thereapeutic effect of the various aloins is different; it is sold at a high price, and requires to be given in comparatively large doses. On the other hand, aloes is used more frequently as a laxative than as a cathartic, and with a good article, the dose is not large.

Wm. McIntyre read a paper on wafer capsules, as a means of administration of medicines (see page 25). Prof. Maisch said wafers in sheets, had long been in use in Europe for this purpose. The introduction of the wafer capsules, by Limousin, had at first materially increased this mode of medication; but it appeared that their use there was already on the decline, and he believed their apparent advantages would not supplant the American methods now in use. R. V. Mattison had become familiar with them two years ago, while in the West, where their use had greatly diminished; he regarded them as an elegant novelty. James Kemble related an incident, showing that sheet wafers had been used in Pennsylvania years ago, for the administration of powders, the wafer being rendered pliable by dipping it into water. Prof. Remington had used the capsules to a great extent, found them to answer a good purpose and claimed for them rapidity of action. Prof. Maisch suggested that a solution would act with still greater rapidity. Charles Bullock did not believe that a greater amount of action could be claimed by the choice of one form of administration over another. The effect of a pill is equal to that of a powder, it may require a little more time; but will frequently cause the medicine to be retained when the stomach would reject the same medicines when given in some other form. J. B. McElroy had used the French wafers, and considered them

very neat. E. C. Jones claimed the use of a press as unneccessary, having seen the rim of two turned wood boxes used as a substitute. Prof. Remington said that two empty morphia bottles had been used by some in place of a press.

On motion, the papers read were referred to the publication committee.

Prof. Maisch exhibited a series of botanical models, made by Robert Brendel, of Berlin, Germany, which have been recently imported, to be used for the illustration of the lectures on botany and Materia Medica. These models are faithful representations of the flowers and other parts of plants belonging to different natural orders, magnified to such an extent that the different parts can be readily seen at some distance; they are painted in the natural colors of the organs which they represent, and many of them can be taken apart so as to exhibit their internal structure. Amongst the models shown were those of *Aconitum Napellus, Viola tricolor, Conium maculatum, Hypericum perforatum, Maruta cotula, Digitalis purpurea, Colchicum autumnale, Atropa belladonua*, the flowers of the potato, strawberry, apple, cherry and others, the entire series comprising sixty-five numbers, of which twenty-five consist of from two to four distinct models.

E. M. Boring directed the attention of the meeting to the following prescription:

℞	Quiniæ sulphatis,	gr.xvi
	Tinct. ferri chloridi,	ʒiss
	Acidi phosphorici diluti,	ʒi
	Syrupi,	ʒiss
	Aquæ, q.s. ad.	ʒiv

A white precipitate being formed, the ingredients were mixed in various ways, and the quinia dissolved in the necessary quantity of dilute muriatic acid, with the effect merely of delaying the appearance of the precipitate. The phosphoric acid used had been made of phosphorus, and the precipitate, having been found to be ferric phosphate, several other samples of dilute phosphoric acid were procured and tested with solution of ferric chloride containing no free acid, by adding 3 drops of the former and 2 drops of the iron solution to one drachm of water, when precipitates would occur. Upon reversing the proportions, using 2 drops of acid and 3 of iron, two of the samples gave precipitates, one became opalescent and two remained clear. One of the latter had been made by Prof. Markoe's process. On mixing the acid with an equal quantity of tincture of iron, diluting this with water, as directed in the prescription, one-half the quantity of the quinia was added, and the solution remained perfectly clear, while the whole quantity of quinia ordered almost immediately caused the appearance of a precipitate. The inference drawn from his experience was, that testing with neutral chloride of iron some definite proportion should be given, because if carried to very dilute solution the resulting phosphate of iron would not remain in solution. This was not so readily observed in using the tincture of chloride of iron, which contains free hydrochloric acid.

I. J. Grahame had met with the difficulty as early as 1868. He had been able to prepare an acid from the glacial acid that would mix clear with tincture of chloride of iron by prolonging the time of heating. The details of the "Pharmacopœia" he regarded as not specific enough in this case.

Dr. Pile said all the glacial phosphoric acid that had lately been examined was found to contain phosphate of sodium, and no means of getting rid of this contamination had been presented. R. V. Mattison thought that if we are aware of this

adulteration, it would not be proper to prepare the medicinal acid from it. There is some difficulty in getting rid of the nitric acid, and too high a heat will generate pyrophosphoric acid.

Prof. Remington suggested, that if an acid which would not at first mix clear with the tincture, were allowed to stand some time, a change would take place; and said that an acid could not be made from the glacial acid that would answer for this purpose unless free nitric acid was purposely left in it. Prof. Maisch did not agree in this statement. Like Prof. Grahame, he had observed glacial phosphoric acid containing sodium compound to be completely converted into orthophosphoric acid; it is an old method, practiced in analytical laboratories, to convert pyrophosphates into orthophosphates, by boiling them with nitric acid. He had pointed out, three years ago, to a number of persons, the cause of the difficulty with the dilute phosphoric acid made from glacial acid. J. W. Worthington had avoided this difficulty by preparing the acid from phosphorus, procured from the manufactory on the Rancocas, which he believed was the only one of the kind in the country.

Dr. Pyle had tested the acid prepared by Prof. Markoe's process for ammonia, by saturating with caustic soda, but did not perceive any odor of ammonia. A sample of an acid, prepared by the same process by A. P. Brown, was tested by Prof. Maisch, and found to contain some ammonia.

Dr. A. W. Miller read the following note on "Substitution of *Gentiana catesbæi*:"

"Mr. M. E. Hyams, of Statesville, N. C., in a recent communication to the writer, states it as his firm belief that no true root of *Gentiana catesbaei* is to be found in the market. Mr. Hyams states, that among the gatherers in the South the *Triosteum perfoliatum* is known as American gentian, and therefore invariably sent out as blue gentian, although there is a marked difference in the appearance of the two roots, as well as in that of the plants.

"The term 'horse gentian' is given by Gray as a synonym for the triosteum. According to Mr. Hyams, none of the gatherers in his vicinity are acquainted with the true *Gentiana catesbæi*."

Prof. Maisch had, some years ago, tried to get specimens of the two roots for his cabinet, but could find none in the market. The two have no resemblance whatever, the subterraneous portion of Triosteum being a knotty, horizontal rhizome, with long woody roots, while the gentian has a true root, resembling that of *Gentiana lutea*, but being much smaller and lighter in color.

Dr. Miller suggested, that as the gatherers were bringing it in, there must be purchasers for it somewhere.

A. P. Brown presented two specimens of spirit of nitrous ether; one a commercial article, the other made in his store. In addition to containing the proper amount of nitrous ether, about 5 per cent., it makes a transparent mixture with copaiba, which the commercial article fails to do.

Adjourned to meet on January 18, at 8 o'clock P. M.

WILLIAM McINTYRE, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

NEW YORK ALUMNI ASSOCIATION OF PHILADELPHIA COLLEGE OF PHARMACY.—The regular monthly meeting was held in Plimpton Hall, Tuesday evening, December 7th.

Mr. Thos. D. McElhenie read the following paper:

LINIMENTUM IODOFORMI.—Having frequent occasion lately to dispense iodoform for topical application, I made some experiments to ascertain the best solvent. Without detailing all the results, the following is offered. Almond oil was selected, as its blandness fits it for application to inflamed throats:

Take of Iodoform	
Camphor	*aa* ℥i ℈i
Ol. sassafras	♏i
Ol. amygdali dulc	♏iv

Powder the iodoform and camphor, introduce into a dry vial, add the oils, and heat in a water-bath, shaking frequently until dissolved. The camphor has the property of increasing the solubility of iodoform in oils, but not in alcohol, and, with the essential oil, serves to cover the odor to which some persons object.

Mr. Wellcome read a paper on the action of solutions of molybdic acid and molybdates in sulphuric acid, as tests for determining the presence of certain organic bodies. He demonstrated by experiments that such tests were unreliable (see page 21). He also presented some specimens of *Grindelia squarrosa*, which he had received from Dr. Bundy, of California. Another species, *Grindelia robusta*, has received some attention as an antidote for poisoning by *Rhus toxicodendron*, and on account of the hypnotic properties ascribed to it; it formed the subject of a paper by Mr. Steele at the last meeting of the American Pharmaceutical Association. *Grindelia squarrosa* is distinguished from that plant by the flower-head being more compact, with the scalesmore firm, and terminating in hard, slender and spreading tips. Its medicinal properties are said to be similar to those of *Gr. robusta*.

Some discussion ensued regarding the wafer capsules (cachet de pain), which are being introduced as the model medium for administering nauseous powders. All who had used them spoke of them as a pleasing thing in theory, but practically a nuisance rather than a boon. They were first introduced into Paris about three years ago, and seem to have met with but little favor in Europe, and to deserve the same here.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN—At the pharmaceutical meeting held November 3d, President T. H. Hills in the chair, a paper on the analysis of cinchona bark was read by Mr. Edward L. Cleaver, in which several processes recommended for this purpose were criticized, and a new process suggested, the essential features of which are that a paste of 100 grams of powdered bark and 25 grams of slaked lime is carefully dried and then exhausted with hot methylated spirit; the liquor is acidulated with sulphuric acid, the spirit distilled off, the remaining liquid filtered and evaporated to dryness with pure carbonate of barium, the residue being exhausted with alcohol, which, on evaporation, leaves the total amount of mixed alkaloids; these are exhausted with ether, the solution evaporated, the alkaloids dissolved in dilute sulphuric acid, the solution heated to boiling, and rendered faintly alkaline by caustic soda, when, on cooling, sulphate of quinia crystallizes out; the mother-liquor retains one part of the same salt for every 300 parts, by measure, of the liquid.

In the discussion following, Dr. Paul, Messrs. Linford and Umney, Prof. Redwood and Attfield took part, some sources of inaccuracies being pointed out.

Mr. Nelson T. Carrington read a paper on the chemical formula of commercial molybdate of ammonium, which, from his analyses, he assumes to be NH_4HMoO_4.

Mr. Thos. Greenish read an interesting paper on Pharmacy in Portugal, in which, among other valuable information, it is stated that Portuguese physicians frequently prescribe foreign nostrums, which are largely imported from France, America and England.

BRITISH PHARMACEUTICAL CONFERENCE.—At the meetings of the Executive Committee, held in November and December, £75 was granted, in sums ranging from £5 to £20, to eight gentlemen, to aid them in undertaking researches on special subjects, the results to be communicated to the next annual meeting, at Glasgow, September 5th and 6th.

The Secretaries announced that the "Year-book" for 1875 was in type, that it would extend to six huudred and fifty pages, that it would be published on or about the 11th of December, and that a copy would be sent, post-free, to every member who had paid his annual subscription.

EDITORIAL DEPARTMENT.

THE FORTY-EIGHTH VOLUME OF THIS JOURNAL begins with the present number, and fully half a century has passed by since the first number of what has subsequently been called the *preliminary* volume was issued, in 1825, its regular and uninterrupted publication, however, dating from the year 1829, since which time a volume has been issued every year. From a quarterly the Journal became a bi-monthly, and, finally, a monthly publication, and its usefulness has made it a welcome visitor to many who are interested in pharmacy, here and abroad. For this we are, in a great measure, indebted to our contributors, who communicated the results of their observations or researches, and we are pleased that the present volume opens so propitiously, with a large amount of original matter from different contributors. It is true that the pharmacist, actively engaged in business, has little leisure for literary labor, but it is equally true that, "where there is a will, there is also a way." The occasions for observations are numerous, even while following the daily routine of business, and if these were noted down and published, they would add to the general stock of knowledge. Amongst the contributors to our last volume, we had the pleasure of welcoming several for the first time, and we take this occasion to invite our readers generally to join the list of those who, for a longer or shorter period, have contributed to these pages, and to record therein their *practical* observations, as well as their *scientific* researches.

POSTAL MATTERS.—Our special thanks are due to our friends in New York, who kindly informed us that the post-office in that city had demanded the payment of double letter postage on the December number, on account of the "Special notice to Subscribers" stitched into it, ruling the same to be an *enclosure*. The matter was at once referred, through the Postmaster of Philadelphia, to the Post-office Department in Washington, from which, under date of December 14th, 1875, the following reply was received:

"*Sir*;—The publications and letter, submitted with your two letters of 8th Dec., are herewith returned, with the information that the New York office has been advised that printed matter, stitched into the body of a magazine, and having reference to the business of its publishers, is held to be an integral part thereof, and not of the character of matter referred to in Section 142 Laws, or 91 of the Regulations.

"I am, &c.,

(Signed) J. W. MARSHALL, *1st Asst. P. M. Genl.*

"GEO. W. FAIRMAN, Esq., *Postmaster*, Philadelphia, Pa."

The Postmaster of New York has informed the Business Editor that the detained Journals had been delivered immediately after the above decision had been received.

LEAD IN MURIATIC ACID.—Messrs. G. Mallinckrodt & Co, of St. Louis, Mo, have submitted to us a letter from Mr. Fred. Reppert, of Muscatine, Iowa, in which it is stated that the solution of chloride of iron examined by him, and found to contain lead (see December number, 1875, p. 575), had *not* been obtained from that manufacturing house.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The Popular Health Almanac for 1876. Edited by Frederick Hoffmann. New York: E. Steiger. 12mo, pp. 44.

Taschenbuch der Geheimmittellehre. Eine kritische Uebersicht aller bis jetzt untersuchten Geheimmittel, zunächst für Aerzte und Apotheker, dann zur Belehrung und Warnung für Jedermann. Herausgegeben von Dr. G. C. Wittstein. Vierte sehr stark vermehrte Auflage. Nördlingen: C. H. Beck'sche Buchhandlung. 1876, 12vo, pp. 301.

Compendium of Secret Medicines. A critical review of all secret medicines analyzed up to the present time. For physicians and pharmacists, also for the instruction and warning of everybody. Edited by Dr. G. C. Wittstein. Fourth edition, much enlarged.

The tendency of the above two works is the same in their aim, to expose the frauds and dangers connected with the manufacture or with the use of the secret or so-called patent medicines. Dr. Wittstein's work was introduced to our readers some years ago, when we published a number of formulas contained in the third edition (see "Amer. Journ. Pharm.," 1871, p. 111). That in less than ten years—the first edition appeared in 1866—four editions have become necessary, proves the usefulness of the work, and that the labor of its editor as a compiler and analyst is well appreciated. The present volume contains the composition of about 800 or more nostrums, cosmetics, disinfectants, etc., the composition of which has been kept secret by the inventors and manufacturers. Amongst that number we find the United States well represented, considering that the volume is in the first line intended to find its field of usefulness on the continent of Europe. There is, however, evidently much room for greater activity in the way of exposing the composition of the numerous nostrums, whether patented or not, with which we are blessed on this side of the Atlantic, and which are imported from the other side to supply any possible deficiency as to variety of style and composition; and we would im-

press the young pharmacists, particularly those who are in quest of subjects for their thesis, not to neglect this promising and important field of original investigation and research.

"The Popular Health Almanac," to which repeated allusion has been made in our last volume, pursues rather a didactic course, by giving useful information on all subjects connected with health matters. In its present garb, it is intended for gratuitous distribution by the pharmacist, whose business card is printed on the cover; but those who would desire to make a nominal charge for it, could, we suppose, have the words, "Presented by," altered to "From." As to the contents of the almanac, we find an admirably written "Introductory," four brief articles on "Applied Health Knowledge," three on "First help in Accidents and Emergencies," and on "Nostrums and their Composition," an enumeration of "Popular works on the subject of health," a number of "Statistical tables," and various other valuable information. Both editor and publisher are deserving of praise for the manner in which this first number has been prepared. May it be the forerunner of a long series of annual publications which, in the beginning, promise to fulfill an important missson in the distribution, among the people, of sound information on the various subjects affecting the health of the individual as well as of the public.

We take great pleasure in recommending both the above works, Dr. Wittstein's book more particularly to those who are familiar with the German language, the "Health Almanac" to everyone of our readers; and it is our belief that the pharmacist engaged in business will be amply repaid for the small outlay incurred in procuring this publication (250 copies for $10) for the use of his customers. It certainly possesses an intrinsic value which is not found in all the nostrum almanacs combined.

Proceedings of the American Pharmaceutical Association at the Twenty-third Annual Meeting, held in Boston, Mass., September, 1875. Philadelphia: Sherman & Co., printers. 1875. 8vo, pp. 899. Price, in paper covers, $7.00, bound, cloth, $7.50.

This is the largest, and we believe also, the most interesting volume issued by the Association, for which it was deemed desirable to use a more calendered paper than for the previous issues. About 460 pages are occupied by the "Report on the Progress of Pharmacy," 70 pages by reports of committees, 180 pages by original papers, and the remainder by the minutes, constitution, roll of members, etc. An excellent likeness of the late Professor Edward Parrish, printed from a steel-plate engraving, and over 60 wood-cuts embellish the work.

The volume is now in the hands of the binder, and will be issued to all entitled during the present month. Copies of it, or of complete sets of the proceedings, may be obtained by addressing the Permanent Secretary, Prof. J. M. Maisch, Philadelphia.

A Text-Book of Human Physiology; designed for the use of Practitioners and Students of Medicine. By Austin Flint, Jr., M. D. New York: D. Appleton & Co., 1876. 8vo, pp. 978.

The completion of the author's large treatise on "The Physiology of Man" has been noticed on page 494 of our volume for 1874; the work before us is a condensation of those five volumes into one, to render it more adapted for the daily wants

of the student and practitioner. It is illustrated by three lithographic plates and 313 woodcuts, many of which are exact reproductions from the works of celebrated investigators. The work will be found a valuable addition to the library of the medical student and practitioner.

The reception of the following publications is hereby acknowledged:

The Chemists and Druggists' Diary for 1876. 4to. It is presented to every annual subscriber of the "Chemist and Druggist."

Transactions of the 25th Anniversary Meeting of the Illinois State Medical Society, held May, 1875. Chicago, 1875. 8vo, pp. 288.

Manitou, Colorado, U. S. A., its Mineral Waters and Climate. By S. Edwin Solly, M. R. C. S. 1875. St. Louis: J. McKittrick & Co. 8vo, pp. 40.

Battey's Operation. By Dav. W. Yandell, M. D., and Ely McClellan, M. D. Louisville, 1875. 8vo, pp. 16. Reprinted from the "American Practitioner," for October, 1875.

Untersuchungen über den Einfluss der Temperatur auf Bakterien-Vegetation. Von Leonid Bucholtz, Stud. Med. Investigations on the Influence of Temperature upon the growth of Bacteria. The experiments were made in Prof. Dragendorff's laboratory at Dorpat.

Cactus, its History, Classification, Proving, and Therapeutical Application. By Rich. E. Kunze, M. D., of New York. Albany, 1875. 8vo, pp. 33. Read before the New York Eclectic Medical Society.

OBITUARIES.

Heinrich Hermann Hlasiwetz was born at Reichenberg, Bohemia, April 7th, 1825. After studying chemistry in Jena, he became assistant at the chemical laboratory at Prague, and in 1851 Professor of Chemistry at Insbruck. Subsequently he accepted a call to Vienna, where he labored in a like capacity until the time of his death, which occurred, suddenly, on the morning of October 8th, by apoplexy. The deceased was widely known as an earnest and careful investigator, many of his researches having been undertaken in conjunction with Rochleder.

R. P. Clayton, of Dover, Del., died, suddenly, last October, in this city, where he was learning the apothecary business. He was a promising young man, and intended to graduate here next spring. In respect to his memory, his classmates will wear a badge of mourning at the next commencement.

Correction.—On page 536 of our last number, line 3 from top, read *salt* for solution, and on page 563, line 19 from top, read *pr. ct.* in place of pint.

CATALOGUE

OF THE

Class of the Philadelphia College of Pharmacy,

FOR THE FIFTY-EIFTH SESSION, 1875–6.

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Myers, Edwin.	Philadelphia,	Pa.	P. P. Fox.
Oleson, Martin Olaf.	Fort Dodge,	Iowa.	Prindle & Youst.
O'Neill, George.	Philadelphia,	Pa.	Powers & Weightman.
Pabst, Otto.	Thuringen,	Germany.	Guenther Pabst.
Parker, Frederick Henry.	Auburn,	N. Y.	John Butler.
Phillips, Jocob Franklin.	Ashland,	Pa.	M. Goldsmith.
Phillips, Thos. Jefferson W.	Deerfield,	N. J.	J. L. Bispham.
Podolski, Louis Adolph.	Philadelphia,	Pa.	Geo. C. Evans.
Poley, Francis Henry.	Norristown,	Pa.	F. B Poley, M. D.
Poole, William.	Wilmington,	Del.	E. Bringhurst & Co.
Porter, Andrew Richard.	Vevay,	Indiana.	J. L. Thiebaud & Son.
Porter, Geo. Cooper.	Kennett Square,	Pa.	Thomas Taylor, M. D.
Pursell, Stacy Brown.	Bristol,	Pa.	Howard Pursell.
Quinn, John William.	Hillsboro,	Ohio.	Charles Shivers.
Railey, Irwin.	Versailles,	Ky.	J. B. Weaver.
Reber, William Worrall.	Lehighton,	Pa.	N. B. Reber, M. D.
Reid, Charles Milnor.	Conshohocken,	Pa.	C. H. Reid.
Rigg, Morton.	Norristown,	Pa.	Powers & Weightman.
Righter, William H., M. D.	Wilmington,	Del.	H. R. Bringhurst.
Risk, Clarence Henderson.	Philadelphia,	Pa.	Van Buskirk & Apple,
Ritter, John.	Chicago,	Illinois.	Thomas Braun.
Robbins, William Henry.	Philadelphia,	Pa.	A. Robbins.
Robinson, William Duffield.	Chambersburg,	Pa.	C. H. Cressler.
Roe, Thomas Coombs.	Camden,	Del.	
Roepper, Francis Abraham.	Bethlehem,	Pa.	Simon Rau & Co.
Rogers, Joseph Collin.	Frenchtown,	N. J.	C. J. Nice, M. D.
Rosenthal, David Abraham.	Philadelphia,	Pa.	Dr. Toboldt.
Rosenwasser, Nathan.	Cleveland,	Ohio.	W. H. Spieth.
Ross, David Hamilton.	Philadelphia,	Pa.	Bullock & Crenshaw.

Matriculants.	*Town or County.*	*State.*	*Preceptor.*
Ruff, William.	Sandusky,	Ohio.	Charles Shivers.
Ryerson, Henry Ogden.	Newton,	N. J.	Samuel Campbell.
Sandt, Geo. Lewis.	Easton,	Pa.	R. W. Richie, M. D.
Schimminger, Geo. William.	Philadelphia,	Pa.	J. W. Dallam & Co.
Scheehle, George Philip.	Wheeling,	W. Va.	W. C. Bakes.
Schlosser, Gerhard.	Baden,	Germany.	Dr. Rizer.
Schools, George William.	Lebanon,	Pa.	Jas. A. Armstrong, M. D.
Schroeder, Henry.	Chicago,	Illinois.	Gale & Blocke.
Schwartz, Arthur.	Philadelphia,	Pa.	J. J. Cumming, M. D.
Selinger, John Anthony.	Pottstown,	Pa.	John Oddy, M. D.
Semple, George Miller.	Easton,	Pa.	H. B. Semple.
Sheridan, James Henry.	So. Bethlehem,	Pa.	G. C. Boyer.
Shinn, Howard Granville.	Burlington,	N. J.	H. Hutchison.
Sides, Howard Buckman.	Philadelphia,	Pa.	Samuel Gerhard.
Smith, Albert Henry.	"	Pa.	Herm. Vogelbach.
Smith, Clayton Kerper.	"	Pa.	Samuel Campbell.
Smith, Joseph Stahel.	Warren,	Pa.	J. R. Stevenson, M. D.
Smith, William Harrold.	Philadelphia,	Pa.	J. P. Remington.
Sommers, Richard Miller.	Camden,	N. J.	C. M. Schellenger.
Sonnick, John William.	Buffalo,	N. Y.	Rieffenstahl Bros.
Spenceley, Cornelius Ederson.	Philadelphia,	Pa.	W. A. Musson.
Spengler, Allen.	Easton,	Pa.	W. Notson, M. D.
Steuben, Milton Richard.	Bethlehem,	Pa.	H. A. Bower.
Stevenson, Richard Graham.	Camden,	N. J.	W. R. Warner & Co.
Stewart, Frank Edward.	Homer.	N. Y.	H. C. Blair's Sons.
Stewart, James Tait.	Philadelphia,	Pa.	Robb R. Stewart.
Stinson, William James.	Macomb	Ill.	G. D. Keefer & Bro.
Stockton, William Wood.	Mount Holly,	N. J.	J. Whitelock Smith.
Strickler, Jacob.	New Bloomfield,	Pa.	M. B. Strickler.
Suess, Paul John.	So. Bethlehem,	Pa.	William Stahler.
Sweitzer, Morris Kemerer.	Bethlehem,	Pa.	Hess & Snyder.
Taylor, Walter Adolphus.	Atlanta,	Ga.	J. A. Taylor.
Taylor, Winfield Scott.	Camden,	N. J.	Bullock & Crenshaw.
Terrill, George Morton.	Salem,	Va.	G. H. Landon & Co.
Thorn, Albert Livingston.	Bordentown,	N. J.	Henry Schmidt.
Tobey, Charles William.	Troy,	Ohio.	E. F. Rinehart.
Tomlinson, Wm. H.	Harrodsburg,	Ky.	
Toulson, Milbourn Asbury.	Chestertown,	Md.	B. N. Bethel, M. D.
Trimble, Henry.	Chester,	Pa.	S. M. McCollin.
Trout, Wm. Wesley.	Carlisle,	Pa.	H. C. Blair's Sons.
Trupp, Louis.	Philadelphia,	Pa.	J. Wendell, Jr.
Unangst, Eugene Peter.	Bethlehem,	Pa.	Herman Gerhard.
Van Gorder, Albert Hapgood.	Warren,	Ohio.	Wm. Hapgood.
Walker, Henry Crawford.	Wilmington,	Del.	Smith & Painter.
Walker, John William, Jr.	Martinsburg,	W. Va.	J. L. W. Bakerr.
Wallace, Ellerslie.	Philadelphia,	Pa.	
Warfield, John Francis.	Columbia,	Tenn.	R. H. Frierson.
Warrington, Charles W.	Morristown,	N. J.	S. M. McCollin.
Watson, Charles Henry.	Philadelphia,	Pa.	Wetherill & Bro.
Watt, Harry Calvin.	Indiana,	Pa.	H. C. Blair's Sons.
Webb, Morrison Wright.	Salem,	Ohio.	Chas. L. Cumming.
Webber, Joseph Leroy.	Springfield,	Mass.	J. T. Webber & Co.
Weber, Jeremiah.	Philadelphia,	Pa.	M. Coombs.
Weis, William.	Reading,	Pa.	M. J. Cumming.
Wetser, William Puffer.	York,	Pa.	A. P. Brown.
Werckshagen, Otto.	Philadelphia,	Pa.	C. A. Werckshagen.
Wells, Ebenezer Miller.	Raymond,	Miss.	J. M. Boyle, M. D.
Wetherell, Wm. Henry.	Philadelphia,	Pa.	Wetherill & Bro.
Wheaton, Theodore Corson.	Seaville,	N. J.	Jas. N. Marks.
White, Andrew Allison.	Philadelphia,	Pa.	
White, Hugh.	"	Pa.	Bullock & Crenshaw.
Whiteside, William Elder.	"	Pa.	P. S. P. Whiteside, M. D.
Wicker, Fred. Collins.	Chicago,	Ill.	Geo. O. Guy.
Williams, Luther Thomas.	Centreville,	Md.	H. R. Warner & Co.
Williams, Thomas Davis.	Minersville,	Pa.	J. B. Moore.
Williams, William Chapman.	Havre de Grace,	Md.	E. M. Rocke.
Wilson, Alexander.	Philadelphia,	Pa.	John Moffett.
Wilson, James Alexander.	"	Pa.	Powers & Weightman.
Witmer, John Alfred.	Lancaster,	Pa.	S. S. Bunting.
Witsil, George Edward.	Beverly,	N. J.	H. L. Wittkamp, M. D.
Wittkamp, Henry Louis von.	Philadelphia,	Pa.	Barker, Moore & Mein.
Woolston, Wm. Norton Shinn	Mt. Holly,	N. J.	C. H. Dwyer.
Worley, George Melville.	Covington,	Ohio.	Thos. A. Worley.
Wright, Frank Elisha.	Batavia.	N. Y.	
Wright, John Lewis.	Warrenton.	Geo.	J. T. Shinn.
Zacharias, Isidore.	Savannah,	Ga.	J. Lippman & Bro.
Zelley, William Henry.	Hartford,	N. J.	C. Ellis' Son & Co.
Ziebach, Edwin Robert.	Fremont,	Pa.	J. H. Shultz.